The Builder.

VOL. LI. No. 2276. SATURDAY, SEPTEMBER 18, 1886.

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Administration Report on the Railways in India for 1885–86.

THIS Official Report, which contains a mass of useful and intelligently-tabulated information, is concise and to the purpose, and has the rare merit of enabling outsiders, specially interested in the subject, to ascertain such particulars as they may individually want without the labour so often involved in wading through an array of figures, the gist of which only the initiated can gather. In order to set those particulars before our readers, it will be convenient to follow the order maintained in the Report itself, which opens with the statement that the receipts for the year 1885 show an increase over those of the previous year of 1,196,643*l.*, and that the percentage on the capital expenditure gives a return of 5·84 per cent., against 5·27 per cent. in that year. The increase is due largely to improved results obtained from working the Frontier lines now forming the north-west system, and which have contributed 43·4 per cent. of that increase. There was a considerable movement of military stores and railway material likewise, but it did not amount to more than 12·2 per cent. of the total receipts on those lines. As regards merchandise, the total tonnage has increased by 1,887,378 tons, or nearly 15 per cent., of which no less than 1,159,386 tons have been in grain and pulses. A comparison of the receipts during the first four months of the three years 1884-5-6 shows an increase of over 400,000*l.*

During the past year 376¾ miles were completed and opened, making a total of 12,376 miles open for public traffic throughout India, besides 3,767 more miles under construction, and an additional 606 miles which have been subsequently sanctioned. Of these last, 383 miles belong to the Indian Midland Railway Company's system, a temporary line of 58 miles to the top of the Bolan Pass, and an extension of 50 miles of the Sind Pisheen Railway to the fort of the Amran Range,—two lines which signify the pushing on of our railway system into Affghanistan to within 100 miles of Kandahar, a not too speedy move towards the direction in which Russia has made far greater strides than ourselves.

The total length of 12,376 miles is distributed as follows:—

State Imperial and Provincial lines	7,112½	miles.
Guaranteed companies	3,922½	,,
Assisted companies	645½	,,
Other companies	7¾	,,
Native states	687¾	,,
Total	12,376	,,

Turning to the works in progress, the most remarkable feature is the number of large bridges under construction, of which may be more particularly specified those being erected over the Hooghley at Calcutta, consisting of one central span of 120 ft. and two side spans of 540 ft. each; another over the Jumna consisting of ten spans of 250 ft.; a third over the Sutlej near Ferozepore, of twenty-seven spans of 150 ft., and the bridge over the Indus at Sukkur, which is awaiting the arrival of the large span of 790 ft., with which the main channel of the River between Rohri and Bukkur Island is to be crossed. The state of progress on each line is concisely given in the Report, the most interesting portion of which is contained in an unofficial communication from the engineer in charge of the Sind Pisheen Railway, on the line to Kandahar. The difficulties encountered from climate and other causes are graphically described, of the nature of which the following extract will give an idea.

"The tunnel near Kulhali has proved a most difficult job. The soil is so rotten that the roof is utterly unreliable, and falls in from above, forming a high arch above the timbering, from which enormous pieces of rock come down from 50 ft. to 60 ft. in height, and crush everything it is possible to put up. For some time work was stopped, owing to the impossibility of getting any workmen to go into such danger, but charges of dynamite were put in from the hill above on to the roof, and the explosion blew out a crater down into the tunnel. This is now being taken out from above, and it is hoped the 75 ft. of tunnel between the two masonry faces may be secured and lined with masonry arching before the sides come in. For the last three months work has been going on day and night, with electric lights, but with very slow progress, the earth squeezing in to the made parts of the tunnel as fast as taken out through the tunnel ends." The construction of the line through the Bolan Pass is a work evidently not only of considerable difficulty in itself, but one aggravated by the accompaniment of intense heat, cholera, sunfever, and dysentery, which completely demoralised the labourers and caused them all to desert. On the upper portion of the Pass the climate still proved a source of trouble, though in the opposite way. Here the sufferings were occasioned by extreme cold, which brought on pneumonia, and superadded to all the rest, was scarcity of water, which was only procurable at a distance of two miles from the line. Another noticeable work is a 2 ft. 6 in. gauge line, opened in the district of Kattywar, the permanent way of which is made with steel rails, 19 lb. to the yard, with transverse steel sleepers, 3 ft. 6 in. long by 5 in. wide, spaced 10 to the 24-ft. rail. The engines are of two classes, the heaviest, with six wheels coupled, weighing 10 tons, with a load of 3½ tons on a pair of driving-wheels. The single line is estimated to cost the very low rate of 1,544*l.* per mile.

Out of 14,993 miles of track, including sidings, 9,750 miles are laid with timber sleepers, 4,521 with cast-iron sleepers, and 335 miles with steel sleepers. No comment is made as to the relative economy of these different pattern sleepers, either as to first cost or subsequent durability.

The chapter devoted to fuel consumption and supply contains a statement of the rate of consumption and cost per ton and per train mile, showing such very marked differences that it is to be regretted no attempt is made to explain the reason for such great variations. The lowest consumption appears to be on the Nalhatty line, on which Bengal coal is used exclusively, and which amounts to 19·76 lb., at a cost of 1½d., the average cost of the coal itself being nearly 14s. per ton. The highest rate is on the Wardha coal line, being 92 lb., costing 3d., while the coal itself costs only 6s. per ton. On the Indus Valley Railway, where the fuel used is English coal, patent fuel, and wood, principally the latter, the consumption reaches 117 lb., costing 7d., while the average price of the fuel is 11s. 3d. per ton. On the E.I. Railway the consumption is 47·56 lb., costing 1d., while the price of the coal is only 4s. 3d. per ton. The mines producing this coal are worked by the railway company itself, which turns out the coal at the low price of 4s. to 6s. per ton. At a place called Khatun, in Scind, veins of petroleum oil have been struck. It was sent to Sukkur to be used in the boilers there, and as far as they went the trials were most satisfactory. Subsequently favourable experiments were made with the engine pulling a fully-loaded train, so that the question now remains as to what supply can be counted on, and at what cost. The chapter concludes with the announcement that a concession has been made to Messrs. Watson & Stewart, of London, by the Government of His Highness the Nizam, to carry on mining operations at the Singareni coal-fields, which are situated not far from the first barrier on the

river Godavery, whence that river is navigable all the year round to the coast.

From an analysis of the financial details, the general result of which is noticed at the outset of the Report, it appears that the total capital outlay on Indian railways amounted on 31st December last to 161,917,840*l.* (at the conventional exchange of two shillings to the rupee) of which 71,032,838*l.* have been expended by Guaranteed Companies, 82,255,391*l.* on the State Railways (Imperial and Provincial, including the E. I. R.), 4,821,379*l.* on Native State Lines, and 3,808,232*l.* on Assisted Companies lines.

The gross receipts during the calendar year 1885 amounted to 17,987,625*l.*, being an increase of 1,923,400*l.* over those for 1884, while the working expenses have been 8,863,294*l.*, or only an increase of 707,137*l.* over those of the same year. The net revenue amounted to 9,126,361*l.*, and the net earnings on all lines yielded a return of 5*l.* 12s. 9d. per cent. as compared with 5*l.* 1s. 9d. in 1884. Of this return the E. I. R. yielded 8*l.* 8s., and the Guaranteed lines 5*l.* 8s. 4d. per cent. The State lines, excluding the E. I. R., gave 5*l.* 9s. 7d., the Assisted lines 1*l.* 13s. 11d., and the Native States 2*l.* 13s. per cent. There has been a satisfactory increase both in the number of passengers carried and in the tonnage of goods. The former amounted to 80,864,779, being an increase of 7,049,660 over the previous year, and the receipts from coaching traffic amounted to 5,538,126*l.*, or 467,372*l.* more for the same period. The aggregate tonnage was 18,925,385 tons, the receipt from which yielded 11,915,375*l.*, being an increase of 2,262,378 tons and 1,349,434*l.* over the year 1884.

An analysis of the capital expenditure shows that the cost of 7,272 miles of 5 ft. 6 in. gauge lines amounted to 126,222,720*l.*, giving an average mileage rate of 17,357*l.*, the net earnings per mile being 1,072*l.*, or about 6 17 per cent., while 3,536 miles of mètre gauge lines cost 26,928,227*l.*, or a mileage rate of 7,632*l.*, the net earnings being 341*l.*, or 4·45 per cent. In round numbers, the average length open during the year 1885 was 12,092 miles, upon which the traffic work performed was equivalent to 3,640 millions of passengers, and 3,320 million tons of goods carried one mile. Selecting the E.I. and the G.I.P. as the two busiest lines, the traffic along them in passengers amounted to 865,745,800, and 448,419,661 individuals, equivalent to a *daily through* traffic of 1,411 and 816 on their respective lengths of 1,681 and 1,505 miles. Similarly the goods traffic aggregated 1,048,601,489 and 658,165,314 tons over one mile, giving a *daily through* traffic of about 1,700 and 1,200 tons respectively. Five chief items, viz., coal, cotton, grain and pulses, salt, and seeds, make up 10,390,000 tons out of the total traffic of 14,000,000 tons of goods, exclusive of railway material and Government stores. The total number of passengers carried shows an increase of 9·55 per cent. over that carried in 1884. The passenger mileage has increased 8·48, and the receipts therefrom 7 00 per cent. Of the total number carried in 1885, the lower class passengers constituted 97·27 per cent., the second class 2·28, and the first class only 0·45 per cent. The distances travelled by each averaged 44, 67, and 80 miles, and the fares a trifle over ¼d., ½d., and 1½d. per mile respectively. The lowest average cost of hauling one passenger unit over one mile on the broad gauge was *one-tenth* of a penny on the Indus Valley line, and on the narrow gauge nearly *one-eighth* of a penny, the receipts for this work being 0·3 and 0·27 of a penny.

The total working expenses during 1885 amounted to 8,770,196*l.*, the percentage on the gross receipts being 49·27, against 50·47 in 1884. The lowest percentages were 34·30 on the Jodpore Railway, 35·26 on the E. I. R., and 40·87 on the Indus Valley,—figures which have not yet been reached on any of the English lines.

The expenses per train mile average nearly 4s., the lowest being 2s. on the Bengal and N.W. Railway, and 3s. 6d. on the East Indian Railway. The rates for goods quoted in the Report are those for short distances. That for wheat is ½d., and for salt, ⅝d. per ton mile. On the Eastern Bengal Railway, the rates appear to have varied considerably, especially those for jute, which had to be reduced to an abnormally low figure, ¼d. per ton, on account of the water-carriage competition. That rate, however, could scarcely have covered the working expenses. On the Bengal and N.W. Railway, grain and seeds are carried short distances at 0·425, and salt at 0·375 of a penny, but from Delhi to Calcutta,—954 miles,—a special rate for grain is fixed at only 0·27 of a penny.

It is satisfactory to learn that as regards the persons employed on the open lines, the natives of India form 93·84 per cent. of the whole body of servants, whose total number reached 215,886 individuals; for it proves what an opening for remunerative employment of all kinds the railways have created.

More than thirty-five years have elapsed since the railway system was first introduced into India by one of the ablest Viceroys that England ever sent to that country, the late Lord Dalhousie; but it is within the last twenty years that the great expansion has taken place; and though the progress made cannot be called rapid, it has, nevertheless, been sure, and the Government are to be congratulated on the financial success which has been attained on the great arterial lines. Seeing that the guaranteed lines are now earning more than the guarantee, it would seem that whatever technical objections there may be to the guarantee system, and whatever inconveniences may temporarily arise from unfavourable exchanges for paying the interest on capital raised in England pending the earnings covering the guarantee, the ultimate financial position is, nevertheless, stable, and the Government finally recoups itself even directly the guaranteed amounts, to say nothing of the gain derived by the augmentation of the indirect sources of revenue which are sure to follow increased facilities of communication.

A STROLL BY THE WELLAND.

IT is one of the boasts of Northamptonshire that the fields of Naseby give rise to three great streams, which discharge into oceans separated by the whole breadth of the land. So close together as almost to have been all three tainted by the blood shed in one great battle, spring the Avon, the Nene, and the Welland. The fame of the first two is secured. One listened to the lispings of Shakspeare's childhood; the other winds beneath more noble buildings than any stream of like degree. The last of the trio, though it never may boast like its cradle companions, flows, nevertheless, through much that is fair and near much that is interesting. Before it has become a full-grown river it passes close to Market Harborough, beloved of hunting men; thence, marking the northern limit of its native county, it sluggishly drops down to Stamford, and so away through the fens, past Crowland Abbey, to the sea.

Between Harborough and Stamford the Welland hardly does itself justice. It divides and subdivides itself so much that from the mighty viaduct which strides across its valley near Harringworth the river looks like a few small streams. And so indeed it is; and amongst them all they hardly offer a pool where a man may bathe with any comfort. Nevertheless, the valley is a noble one, and, for this part of the world, quite precipitous. Most of Northamptonshire undulates in a very casual way; here it goes up, and there it goes down, and why it does either of these in preference to keeping flat no one can say. But here, by the Welland, there is reason shown for the conformation of the ground. Elsewhere it gives few reasons for its vagaries. Here it gathers itself together and descends abruptly to the meadows through which the Welland flows, and rises in gentler, but still notable, hills on the other side. From all of the many villages which dot the sides of the valley extensive views can be had, without the trouble of climbing the church tower, and in most of them the traveller with architectural tastes need not go to nature for his amusement.

To begin with Dingley, which lies on the Northamptonshire slopes, some two or three miles from Harborough. There is a manor-house of considerable interest, the porches of which were built in the short reign of Philip and Mary, and bear the dates 1558 and 1560, as well as many inscriptions, among which is "In the rayne of Felep and Marey," an inscription which is not to be found on many buildings. It was built by Edward Griffin, who was Attorney-General, and, consequently, made enough money to buy a large tract of land in the neighbourhood. But though the Griffins were new-comers in 1558, twenty years later they were sufficiently acclimatised for that excellent builder, Sir Thomas Tresham, to place their arms in two several places on his market-house at Rothwell,—a distinction accorded to only a select few, most of the numerous arms occurring but once. Of course, Griffin bore a griffin for his arms.

A little way further east, and some two or three miles from the river, is Stoke Albany, where is much to attract the traveller. In addition to the church and some characteristic cottages, there is the old Manor House, a fourteenth-century building, once the home of the Lords De Roos, whose arms appear above the doorway, while on a buttress are two panels, bearing a monogram with a crown, and an "I H S." Who put these religious monograms there? Were they the outcome of the general piety of the age, or some special appeal

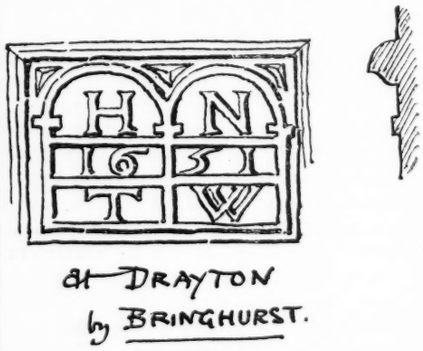


Fig. 2.

in mitigation of violence and crime? We know nothing beyond what the stones tell us: no more of the builder of the house than of the De Roos who lies buried in the church, and from whose tomb all record has gone, unless haply this inscription, preserved in an old collection of such sentences, belongs to him:—"Hic jacet Johannes Roos le bonne compagnion." Of all the life of John De Roos, of all the deeds which he did, of the houses he built for himself, and those which he knocked down for his neighbours, of his wit and his wisdom, we know nothing. All we know is that he was a "bonne compagnion." And what was that? Perhaps a kind, courteous, fine fellow, ever ready to help a friend. Perhaps a good man at a tankard, merely. However, he was a De Roos, and he or his must have lived at the old Manor House, and have read those monograms, and very likely reverenced them.

In crossing over into Leicestershire from Stoke Albany the road goes through Ashley, where there is nothing of interest. On the Leicestershire side is Medbourne, where is an ancient footbridge over the stream; and, overlooking the Welland, perched on the top of a knoll, is Bringhurst. Here in old times dwelt the Norwiches, of whom one, Symon, slew an ancestor of all the Treshams, the family which subsequently played such a prominent part in Northamptonshire. In the year of grace 1451, Sir William Tresham was quietly going home from Northampton to Sywell, where the family then lived (before they moved to Rushton), when he was suddenly fallen upon as he was saying his matins and cruelly thrust through with a spear. His servants, coming up presently, found him in this deplorable state, and, for the better carrying of him back to Northampton, they cut off each end of the spear that stuck out at the back and front. But when they reached the

town and pulled out the rest of the truncheon the patient died.

In Bringhurst there is not much to see. An old house opposite the church presents the characteristic features of the country side, which, simple as they are, never fail to give satisfaction (fig. 1). This is nothing more than a farmhouse, and is too late in date to have been the home of the vengeful Symon Norwich.

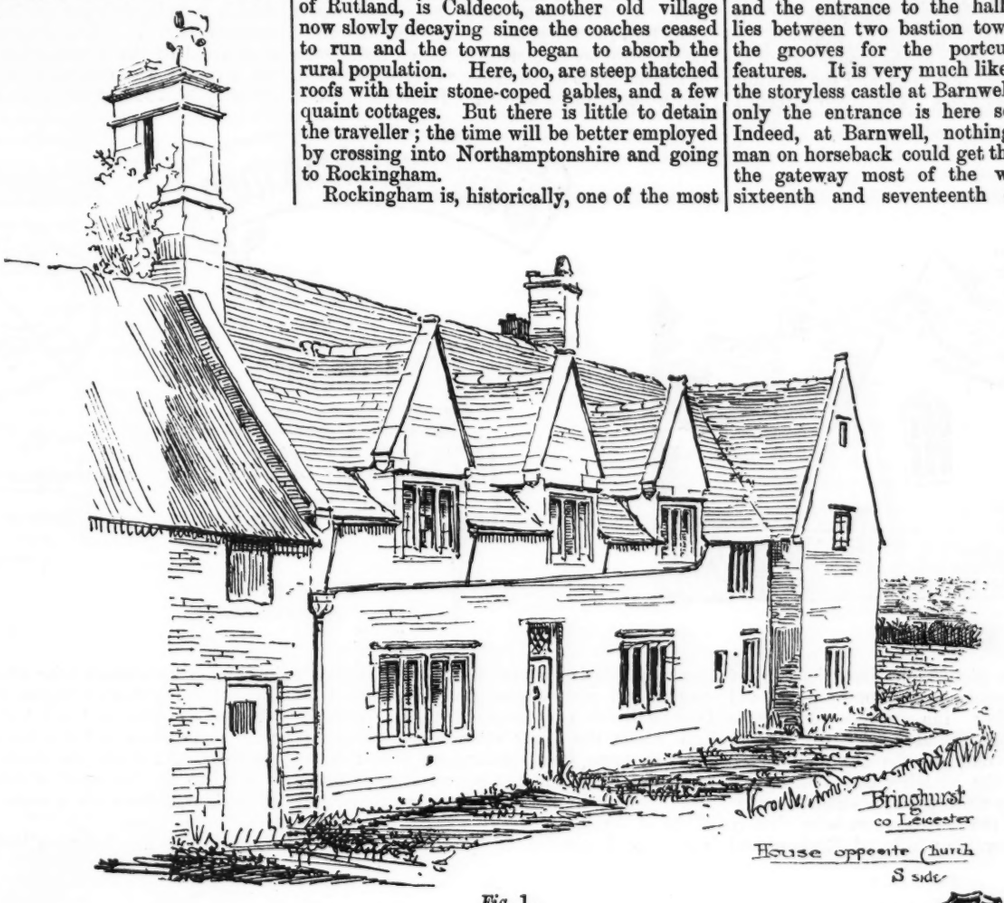


Fig. 1.

In Drayton, a hamlet close by, on a coped gable is a date-stone (fig. 2), which, at small cost, contrives to give a very valuable touch to the little house it adorns. At Holt, up on the hill further away from the Welland, is a large old house, the residence of that excellent sportsman, Sir Bache Cunard. Though considerably modernised internally, the porch and part of the front are of very good Late Gothic architecture. The church, which stands so close to the house as to look like part of it, is also of considerable interest.

Resuming our stroll down the stream from Bringhurst, we soon come to Great Easton, a rambling village with many picturesque corners. Its steep coped gables and thatched roofs give it an old-world air, while signs of departed magnificence occasionally appear in cottages boasting elaborate architectural features evidently brought from some demolished mansion.

Further on, and just inside the little county of Rutland, is Caldecot, another old village now slowly decaying since the coaches ceased to run and the towns began to absorb the rural population. Here, too, are steep thatched roofs with their stone-coped gables, and a few quaint cottages. But there is little to detain the traveller; the time will be better employed by crossing into Northamptonshire and going to Rockingham.

Rockingham is, historically, one of the most interesting places in the neighbourhood, as well as one of the most important on the Welland. It has been the site of a fortification from the times when the ancient Britons cast up their mounds. William the Conqueror made it the chief stronghold of the district, and within the shelter of its walls many of his successors placed themselves and their retinue when they came to hunt in Rockingham Forest. In the time of William Rufus a most important meeting of prelates and nobles was held in the chapel, to decide a knotty point regarding the appointment of Archbishop Anselm. In those days there were two infallible popes, and it seems that, in the king's opinion, Anselm was appointed by the wrong one. The council came to no definite decision, and the question really answered itself in course of time. This was so far back as A.D. 1095, and no vestige of the chapel is left, though the site is still pointed out. In fact, we must leap over two hundred years before we come to any of the existing work. There are, however, considerable remains of late thirteenth-century work in the great gateway and the entrance to the hall. The gateway lies between two bastion towers, and retains the grooves for the portcullis, and other features. It is very much like the gateway of the storyless castle at Barnwell, on the Nene, only the entrance is here somewhat wider. Indeed, at Barnwell, nothing larger than a man on horseback could get through. Within the gateway most of the work is of the sixteenth and seventeenth centuries. The whole effect is extremely good, whether we take the courtyard with its wings or the delightful long and low garden front. But there is no novel detail. The situation is superb, and from the terraces by the ancient walls glimpses of surprising extent may be gained along the Welland valley. A sketch of a corner of the buildings is annexed (fig. 3).

Fig. 3.

Fig. 4.

Gretton, further down the valley on the same side as Rockingham, abounds in old stone farm-houses of the usual Northamptonshire type, but one of which it is difficult to weary. Their charm lies not in abundance of detail (though every feature has some, however slight), but rather in their steep roofs of Colly-Weston slates, their mullioned windows, and the colour and texture of the stone. Here the walls are of brown ironstone, and the dressings of a soft grey freestone. The steep streets of ever to be out of its shadow, stands the Bede House, once the residence of the Bishops of Lincoln, but now shorn of much of its splendour, and relegated to the use of the poor. This was originally the Manor House, built by the Bishops of Lincoln for their own delectation. At the dissolution of the monasteries it came into the Burghley family, and the third Lord Burghley converted it into a bede-house or almshouse to accommodate twelve poor men, two women, and a warden. It retains much of church is of much interest and contains several of their monuments, on all of which the Digby fleur-de-lis is set forth in carving or colour. In the south chapel is an interesting tomb having a Gothic canopy supported by Renaissance pilasters. We append one of the shields from it, showing the fish as an heraldic emblem (fig. 7). The Digbys were deeply implicated in the Gunpowder Plot; indeed, Sir Everard was executed for his share in it, January 30, 1606, at the west end of St. Paul's

Fig. 5.

Fig. 6.

Fig. 7.

the village; its picturesque irregularity; the green, with its stocks and whipping-post; and the neighbouring inn, with remarkable wrought ironwork round its sign, combine to render Gretton one of the most attractive bournes which the sketcher can seek in his stroll. At every turn the eye wanders across the broad valley to the villages we have already passed, to the swelling hills of Rutland and its ecclesiastical character, and abounds in quaint corners and picturesque groupings (figs. 4, 5). Downstairs is a covered corridor or cloister, into which the lower rooms open. Upstairs there is some good glazing, in which occur roses and lilies, and the legend *Deus exaltacio mea* (fig. 6). In one window is a fine portrait of one of the bishops. The large dining-room has a good cornice of quasi-fan tracery of in London, somewhere near where Queen Anne stands looking down Ludgate Hill. Of course where a conspirator lived legend has pitched upon some place as the scene of his nefarious plottings. At Stoke the room over the porch is said to be the spot where the plot was devised, but there are a score of others with equal pretensions.

Stoke Dry has led us a little way back on

Fig. 8.

Leicestershire, bathed in the sun, or darkling with every passing cloud, or to the spires of Lyddington and Seaton, rising from the midst of masses of trees.

It is but a step (perhaps two miles) across to Lyddington in Rutland, and here the seeker for the picturesque may prepare for another feast. The church, with its pretty little spire, is a fine structure of the Decorated and Perpendicular styles, containing several good brasses. To the north of the church, with the green graves between, but so near as hardly ingenious design. The warden offers no difficulty in the matter of access, and is, indeed, glad to find a fresh ear into which he can pour his grievances.

There are many other old houses in Lyddington with more or less character,—mullioned windows, variations of the universal flat-pointed doorway, and simple gables and dormers.

Not far from Lyddington is the little village of Stoke Dry, where the Digbys used to live. Their house has entirely disappeared, but the our journey down the river. Returning to Lyddington, and pushing on through Thorpe-by-Water and Seaton, where we need not rest, we finally reach Harringworth on the Northamptonshire side.

Harringworth, though now a secluded agricultural village, was once the seat of a noble and powerful family, the Zouches; and their descendants to this day take their title, Zouch of Harringworth, from this village. Their house stood amid the broad meadows through which the Welland fritters itself away, a little

to the east of the church. Hardly anything is now left, but probably the windows which are built into some cottages standing in those meadows once gave light to the lords of the soil. In the time of Bridges, the historian of Northamptonshire (1720), the old manor house still remained, as well as ruins of a chapel (the burying-place of the Zouches) between the house and the church. Leland, about 1530, said that "the Lord Souche had a right goodly manor place by the paroche chyrch of this village, builded castelle like. The first courte whereof is clene down, saving that a great peace of the gate-house and front of the waulle by it yet standith. The ynner parte of this place is meately welle maintained, and hath a diche aboute it. The waulles of this ynner court be in sum places imbattelid. And withyn this courte is a faire chapelle, in the bodie whereof lyith one of the Souches byried, and a greate flat stone over him."

Nothing now remains of the chapel, nor of the Zouch, nor of the great flat stone that was over him; but Bridges describes the tomb, and assigns it, from the inscription, to Lorde George Zouche, who died in 1569. It was evidently an elaborate Renaissance monument.

Although the manor-house and chapel of the Zouches have disappeared, the parish church remains, and is of some interest. Apart from its architectural excellence, which is considerable, it would appeal, in a way, to the feelings of the orthodox Churchman, from its peculiar arrangements. The whole of the north aisle is occupied by the vault of the Tryons, except the space reserved for the gangway and the coals. Beneath the middle of the north arcade are the pulpit and clerk's desk, and to these as a centre do all the pews face. Those at the west end face east, those in the south aisle face north, while those at the east end face west, and turn their backs on the chancel, which is absolutely bare, except for a communion-table with a marble top. Near the church is a farmhouse with some quaint yews in front clipped into the semblance of birds; an exercise of a questionable art now nearly forgotten. Further along, and near the middle of the village, is the inn, with a good front (fig. 8), and still further is the market cross. On one of the cottages to the left is a chimney from the old manor-house (fig. 9).

Fig. 9.

The rest of the villages between here and Stamford do not call for much remark. At Wakerley, the church has a very curious Norman chancel-arch. At Barrowden church, across the river, is a good Renaissance wall-monument. Further down is Tixover, a lone church some distance from any houses; lower still is Duddington, with some picturesque houses and a bridge; then comes Colly-Weston, famous for its roofing stone; Ketton in Rutland, with a fine church and excellent stone quarries; then Tinwell, and lastly Stamford.

At Stamford we may well end our stroll, for here we shall be anxious to stop more than one day to ramble about the quaint old town, and, if possible, to visit some of the neighbouring villages which have been already described in these pages.*

NOTES.

WE understand that a question is to be put to the First Commissioner of Works next week in regard to the proposed alterations to Westminster Hall, and the manner in which the appearance of the Hall will be affected by the one-sided intrusion into it of Mr. Pearson's staircases. We hope some members of Parliament may think it worth while to exert themselves to prevent the disfigurement of a building so closely linked with English history.

A CONSIDERABLE time was given at the recent Trades' Union Congress to the question of labour representation. That there should be some working-men members in Parliament is obviously desirable, even though it only be to prevent working-men from thinking that they have no direct representatives of their interests, and so are not properly looked after. But working men do not go the right way to work when they propose that working-men members should be independent of political parties. There can be no such thing as an M.P. who represents a particular interest alone: he represents his constituency, and if he belongs to any particular calling, he speaks with authority on subjects relating to it with the confidence of those who belong to it. But the very way to have labour candidates rejected by constituencies is to allow the idea to prevail that they go simply as representatives of a particular interest. Even the working men of a division or a borough are in most cases no more desirous to have local or general interests neglected for the purpose of a representative representing a special interest than are any other body of the electorate of a place.

THE importance of efficient house sanitary arrangements, as bearing upon public health, is strikingly illustrated in a report of a house-to-house inspection made recently in Chiswick by Mr. Ramsden, Surveyor to the Local Board. It is shown by statistics that in those sub-divisions of the parish where there is a high percentage of houses with the sinks, baths, and soil-pipes connecting directly with the main sewer, the death-rate is proportionately high. For instance, in the Bedford Park sub-division, where the soil-pipes to each house are ventilated, and the sinks and baths are disconnected from the main sewer, the death-rate during the past year has been at the remarkably low figure of seven per thousand of the population. Out of the 215 houses in that part of the parish there was only one of which the soil-pipe was not ventilated; and there were only two dust-bins which were not properly covered. Every one of the sinks was disconnected from the main sewer. On the other hand, in the sub-division of the parish called Chiswick proper there were 212 sinks out of 293 connected directly with the sewer. To this circumstance Mr. Ramsden attributes the heavy death-rate in this district, viz., about 25 per thousand of the population. It appears that throughout the whole parish there are 1,805 sinks and 311 baths connected directly with the main sewer, and out of the 1,500 soil-pipes only 860 are ventilated. These periodical house-to-house inspections undoubtedly tend greatly to the sanitary improvement of a parish. This report shows that, though Chiswick may have an excellent drainage system, the internal sanitary arrangements of too many of the houses are out of harmony with the by-laws. It is satisfactory to know, however, that in many cases the owners are readily carrying out the suggestions of the surveyor.

MR. ANDREW CARNEGIE, of New York, a native of Dunfermline, has intimated to the Lord Provost of Edinburgh that "he would like to do his part in adding to the numerous attractions of the superb metropolis of his native land, and that it would give him great pleasure to present the Magistrates and Town Council with 25,000*l.* for a free library." This munificent gift he subsequently increased by another donation of 25,000*l.* The gift is contingent upon the citizens adopting the provisions of the Library Act, which provide for the proper maintenance of a free library by the imposition of a tax not exceeding one penny in the pound. The Lord Provost seems to desire that the library should be incorporated with the new Municipal Buildings, but there is a widely-expressed opinion that Mr. Carnegie's gift is amply sufficient to provide a separate building, and that it would not materially add to the attractions of the city were the library merged in the civic buildings. Two most eligible sites have been pointed at, one at the south-western extremity of Chambers-street, immediately to the west of the Museum of Science and Art, and the other at George IV. Bridge, on the vacant site between the Sheriff's Court-house and County Buildings. The former of these sites is mostly occupied by a congeries of old buildings, which, through motives of mistaken economy, were not scheduled under the City Improvement Act; these buildings, by the opening up of the new thoroughfare, are of double the value they were at that time, and give to the neighbourhood an air of incompleteness. The site is open on all sides, and is admirably adapted for the purpose. The second of the above sites has the advantage of being the property of the Faculty of Advocates, and adjoins their library, which has the privilege of receiving a copy of every work entered at Stationers' Hall. The library is inconveniently crowded, and the Faculty are not possessed of sufficient means to complete their building, and if the Advocates were approached in a fitting manner, an agreement might be come to whereby the free library would enjoy some of the benefits accruing from the privilege possessed by the older institution. Mr. Carnegie gave a free library and other benefits to Dunfermline some years ago, and a free library and music-hall are in course of erection in Alleghany City at his cost. Such gifts "bless him that gives and him that takes."

THE Liverpool Autumn Picture Exhibition is one of the best which has been held there. A good many of the noticeable pictures are, of course, those which have appeared in London already; but the net has been cast wide. The collection is a very catholic and representative one, and the hanging is very effective. Sir F. Leighton's triptych, for instance, whioh hung at the end of Gallery III. at the Academy, has in the Liverpool Exhibition been hung with a special regard to decorative effect, it being a distinctly and essentially decorative painting; a kind of framework has been formed for it by arranging, above and below it, small pictures of decorative character, selected in regard to their colour harmony as accessories to the large painting; and the whole collocation of colour thus formed is surmounted by draped hangings. The Marlborough Gallery clique is fairly represented by some of its best productions, among which the works of Mr. Kennington are especially good in regard to flesh painting. The success in the hanging is attributed by a member of the committee to the fact that "they knew all the rules about hanging, and had broken them all." Among the works at Liverpool which have been prominent in the London exhibitions are Mr. Calderon's "Ruth and Naomi," Mr. Moore's "Sound of Isla," Mr. Goodall's "Susanna," Mr. Sadler's "Habet," Mr. Bottomley's "Death's Betrothed," &c. As on other occasions, we come across works which held a secondary place in the London picture-galleries, which surprise one by their added force when seen in a new light; Mr. Beadle's "Toil and Storm" for instance, which at the Academy we noted as a fine work, but which asserts itself much more decidedly with its present better light and hanging. A fountain of Minton's ware, playing in the entrance gallery, is a pleasant

* See *Builder*, vol. xlix., p. 527 (Oct. 17, 1885).

addition to the Liverpool Art Gallery; and we must congratulate the Committee also on the good taste of style and make of some new furniture in the way of chairs, settees, &c. An art gallery is a very suitable place to give people practical lessons in regard to good taste in common objects of everyday use, as well as in pictures.

THE Committee of the Manchester Picture Exhibition have succeeded in getting together a greater number of the leading Academy pictures of the year than are to be seen at the Liverpool Galleries; but beyond these there is not such a good average of work nor such a classical tone about the collection and the manner in which it is arranged. Besides Academy and Grosvenor works, there is Mr. Holman Hunt's "Triumph of the Innocents," the new view of which, in a stronger and less artificially arranged light, does not do anything to reconcile us to it or to the absurdly high claims made for it. The flesh-colouring and texture in the figures is very questionable, and the intellectual conception of the painting appears to us only fitted to interest children. Mr. John Reid would, probably, have avoided such very rough painting as is to be seen in his "Shipwreck," had he seen it in the strong light in which it is now hung at Manchester. As it was hung at the Academy, the pathos of the picture was manifest, and the carelessness of the execution was masked by the lighting under which it was seen. There is a fine work by Israels,—"Nothing Left,"—a working man seated by the bedside of his dead wife, which we do not remember to have seen before. Among the names not familiar to us we noticed two or three works by Mr. Anderson Hague, especially "The Return of Tywyn Musselers," which exhibit power and individuality. The permanent gallery of pictures bought for the town includes some important works by Messrs. Holman Hunt, Brett, Goodwin, Legros, Stanhope, and others, placed in a room where they are absolutely lost for want of proper lighting, and might as well not be exhibited at all. If the collection is to be of any use or pleasure to the town, a better room should be built for it.

MR. JUSTICE STIRLING, sitting as Vacation Judge, has just decided a point of much importance in regard to the easement of light. The plaintiff was the holder of a lease for twenty-one years, granted to him by a person who had obtained a lease from the freeholder, who was tenant for life of an adjoining plot of land. Under these circumstances the freeholder could not, as long as he was alive, as a rule, derogate from his grant by stopping the light to the plaintiff's house either by himself or by his assigns. The freeholder, however, under the Settled Land Act, granted this piece of adjoining ground to another person, who began to build, and in so building obstructed the light of the plaintiff's house. The judge held that the light could be obstructed, having regard to the provisions of the Settled Land Act, because by section 20 a lease might be made to override all the grantor's interests, except those binding on his successors, which this was not. The point is one of much legal technicality, which cannot be fully dealt with in a few lines, but the decision is of great importance, because it clearly diminishes the value of property which, were it not for the effect of the Settled Land Act, would otherwise be yearly increasing in value. The house with the light in twenty years would have had an indefeasible right; now not only is this accruing right prevented, but the light is materially obstructed. It is probable that so important a point will be heard of again in the Law Courts.

ONE of the few really practical contributions to the controversy on the permanence of water-colours has been made by Mr. William Simpson in a letter to the *Times*. He has a number of strips of card which have been washed with various water-colour pigments fifteen years ago, cut in half, and one half kept in darkness and the other half in light. Here is a really practical test,—for a period up to fifteen years, at all events. The results are, in the main, in opposition to the pessimist view of water-colour so pertinaciously urged by Mr. Robinson. The majority of the colours thus tested have stood well, and show little difference between the parts exposed to light and those kept from the light. Mr. Simpson proposes to hand over the test pieces to Sir James Linton to submit to the committee which is to consider and report on the subject.

ANOTHER ornamental brick pattern-book which has reached a new edition, that of Mr. Jas. Brown, to which he gives the somewhat high-sounding title, "Brick Ornament and its Application," is, like one we noticed a week or two back, very mixed in style and merit. Mr. Brown's brick is an excellent material; his series of moulded bricks is varied and useful, and many of the more simple diaper patterns are very effective and very suitable to the material. It is when we come to the higher efforts that we meet with things that are questionable, or more than questionable. Who (but simpletons) want imitative natural foliage in brickwork? It is a question whether we want it even in carving; but we certainly do not want it in repeated brick patterns. Then there are many varieties of the apparently undying "swag," a feature which we fancy retains its remarkable popularity chiefly because of all so-called ornamental details it is the most common-place, and the one which it takes least thought to produce. We cannot say no one wants it, for it is the fashion at present, but it is a foolish fashion. *Au reste*, the book is a useful compendium of what can be done, practically, in the way of moulded and decorative brickwork; but there is room for a great deal of improvement and originality in the more ornamental designs.

THE demolition, for rebuilding, of some houses at the corners of Museum and Hart streets, Bloomsbury, affords a good, albeit transient, view of Nicholas Hawksmoor's parish church of St. George. Its site, formerly Plough-yard, is said to have been devised by Lady (Rachel) Russell. She lived in Southampton House, hard by; and died there in the year 1723. This church was consecrated on January 28th, 1731, for a parish which had been taken out of St. Giles-in-the-Fields. It is conspicuous for a fine southern portico, raised well above the street level,—perhaps inspired by those of St. George, Hanover-square, and St. Martin-in-the-Fields,—and the tower at its western side. The singular graduated spire, which Walpole stigmatised as a master-stroke of absurdity, is modelled after Pliny's description of Queen Artemisia's Mausoleum at Halicarnassus, whereof some remains are preserved in the neighbouring British Museum. The crowning statue, upon a round pedestal, of King George I., who here figures according to the epigram as "head of the steeple," is due to the loyal feelings of one William Hughes, M.P., brewer to the royal household. The lions and unicorns, often mistaken for dragons, that guarded its base seem to have disappeared. In this composition, which, however, has many admirers, Hawksmoor was less successful than in his *chef d'œuvre* of St. Mary Woolnoth, Lombard-street. The burial-ground is in St. Pancras parish, being just northwards of the Foundling Hospital.

SINCE the article on the Indian Railway Report, which heads this week's number, was in type, we observe that the subject has come up in Parliament in the form of a question put by Mr. Maclure on Tuesday to Sir J. Gorst, as to whether, considering the present low prices of steel rails, railway plant, &c., the Government would now proceed to the construction of those railways which have been declared to be of urgent public utility for the benefit of the country. The answer returned was formally affirmative, but appears to have been only one of those cautious conventional affirmatives, committing to nothing, which are frequently given by Government representatives in answer to questions of this kind. It is to be hoped that the extension of the Indian railway system will before long receive practical as well as theoretical approval.

THE Berlin Imperial Museum has recently been enriched by three terra cottas of extraordinary beauty. They will shortly be placed in the antiquities room of the Museum, but are not yet shown to the public. The terra cottas are of Athenian workmanship, and two out of the three are characteristically of Athenian subjects. They are all three in a remarkably fine state of preservation. One represents a scene at a tomb; in front of a tall slender stele a woman figure is seated; a warrior in armour stands near her and regards her with fixed and melancholy attention; to the left is an attendant figure. The subject is common enough on the Attic white lekythoi, but rare in terra cottas, and the expression of the whole group is unique. The second terra cotta represents a youth carrying away a maiden. Here, again, the special value of the work consists in the intensity of the expression. The third terra cotta represents a Silenus, cowering as if beneath a heavy burden; the pose is just the same as that of the well-known colossal Silenus in the attitude of Atlas supporting the heavens, found in the Dionysiac theatre at Athens. The department of antiquities has also further been enriched by several remarkable bronzes bought at the sale of the collection Gréau in Paris: specially to be noted is the exquisite little Apollo, restored, with laurel branch in the left and bow in the right hand.

ST. ALBAN'S seems to be a never-failing theme of controversy in the *Times*. Lord Grimthorpe and Precentor Venables are at it now. The latter had referred to the front (by implication) as "Brummagem," and Lord Grimthorpe wants to know why. The Precentor says, because it is modern work pretending to be ancient. It is "making believe very much," as children say, in that case. But Lord Grimthorpe and the Precentor both miss the real point. Lord Grimthorpe's contention is that a man of the nineteenth century has as much right to add a façade to a building as a man of the fourteenth or fifteenth century. Granted. Precentor Venables says it is not bad work, but it has no business to be there, good or bad. We think he is wrong in both points. A modern architect has every right to make his own additions to a building, provided that he do it well. The point exactly is that it is done badly at St. Alban's; it is not good Gothic, but bad Gothic. Lord Grimthorpe, of course, does not know that; but for that he is more to be pitied than blamed. But Precentor Venables ought to know better.

THE TRIUMPHAL ARCHES OF THE ANCIENT ROMANS.*

RETURNING to the list of Roman triumphal arches in France, which we commenced last week by a reference to the fine example at Orange, we first notice the Black Gate of Besançon, which has a fine bold arch of large size, flanked by two Corinthian columns on each side. Their shafts are ornamented with figures and scrollwork. The entablature is on a level, or nearly so, with the spring of the large arch, and from this level a second order of smaller columns carries up the composition to the crown of the arch, where it is completed by a horizontal cornice from pier to pier, enclosing the arch, the spandrels being filled with winged Victories. The interspaces of the piers are also filled in with sculptured figures in more or less perfect state. While the execution has every evidence of late date, the composition shows a design different to any other arch yet indicated.

While the two arches now mentioned have a proportion more lofty than the arches of Italy, at St. Remi (see illustration), also in Provence, is an arch wider than the average of such structures. It appears still more so from its upper portion

* See pp. 333, 371, *ante*.

being destroyed. There is a bold semicircular arch, the architrave being filled in with a banded garland of oak leaves, flowers, and fruit. A wide space on each side has two fluted columns to each face, mounted on a continuous base, and with tall pedestals to each. The capitals are gone, and also the whole of the entablature, but there are winged Victories remaining over the arch which indicate the height of its commencement. There are also sculptured figures corbelled out from the walls between the columns. This fine arch is of a good period, and the workmanship is excellent. It stands in a solitary spot, and it is difficult to realise that this is the site of a Roman city.

Close to it is the graceful monument called the Tomb of St. Remi, one of the most beautiful ancient works in existence.

Midway on the Roman bridge of Saintes is a triumphal arch, again of a different type. It consists of two plain semicircular arches, admirably adapted to the position for ingress and egress to the city. They spring from a heavy impost of architrave, frieze, and cornice, which is continued from end to end of the building. At each angle, as well as at the jambs of the arches, are broad, low, fluted pilasters, with large Corinthian capitals, out of all proportion to the height. Above, there is a thin fluted column at each of the angles only, and on them is mounted an entablature with a plain dentilled cornice, just level with the apex of the two arches. Above this, again, is a plain attic, having also a cornice. The inscriptions are too illegible to be deciphered.

At Langres there is an arch of somewhat similar design, there being two semicircular openings, but the position is on solid ground and not on a bridge, and the proportion is larger and taller. A bold Corinthian fluted pilaster of fair proportion separates the two arches, while the flanking piers right and left have each two similar pilasters. The entablature is continuous, not being broken over the pilasters, and the frieze has been filled in with sculptured shields and other trophies.

Like the Arch of Janus at Rome, and some others yet to be mentioned, the fine arch at Cavellon is four-sided, each side presenting a single bold arch of large size, the angles having pilasters covered with elaborately carved scrolls. The arches spring from moulded imposts, and the soffits are panelled in small squares alternating with others of lozenge shape, the whole being filled in with rich carving.

The Roman bridge at St. Chamas (see illustration) has a triumphal arch at each extremity, the whole forming an architectural design of great beauty, deserving of far greater attention than it has hitherto received. Indeed, the whole of the fine Roman works of Provence merit much more notice than they have had at present, and it must be a matter of regret that while so many other countries are explored for works which prove to be of inferior merit, those of this favoured land are ignored or forgotten. A plain bold arch of solid masonry forms the bridge over the narrow river. The triumphal arches, which are alike, consist of a single broad arch, formed by a moulded archivolt springing from an impost and a plain pilaster. At the angles of the piers are fluted pilasters with Corinthian caps. The entablature has a dentilled cornice, a frieze filled in with carved scrollwork, an inscription, and a moulded architrave. It is broken around the angle pilasters, above which are crouching lions. There is no attic or blocking course.

The Arch of Carpentras, now laid open from the walls, which had so long encumbered it, presents a single arch springing from fluted pilasters, and having angle columns. The whole of the superstructure has been destroyed. There are some curious figures which indicate a late date. One of these is a lion grasping a human head, similar to what has been noticed on some carvings in England.

There was a fine arch at Arles, but it was demolished in 1743. M. de Caumont speaks of fragments of friezes, and of other sculptured stones, which he believed to have formed portions of other arches at Narbonne, Perigueux, Tours, and Sens.

These few indications will be sufficient to show how rich ancient Gaul must have been in monuments of the class under consideration, and how different were their designs to those of similar works elsewhere.*

* To be continued.

THE POST-OFFICE EXTENSION IN ST. MARTIN'S-LE-GRAND.

In his capacity of arbitrator between the two parties, Mr. John Clutton has determined his award concerning the claim advanced by the Governors of Christ's Hospital as against the Postmaster-General. It is adjudged that the former shall receive, in terms of the Lands Clauses Act, a sum of nearly 130,000*l.* as purchase-money and compensation for so much of their City property as is required to carry out the proposed extension of the General Post-Office, St. Martin's-le-Grand. This sum exceeds by some 15,000*l.* the departmental assessment; whilst on the other hand the surveyors who acted on behalf of the hospital gave in estimates ranging in amounts from 160,000*l.* to 170,000*l.* The case was heard at the Surveyors' Institution, Westminster, the arguments lasting over several days. The late Attorney-General, Mr. Bidder, Q.C., and Mr. Casserley held briefs for the Government; the hospital authorities were represented by Mr. Littler, Q.C., and Mr. Herbert Lake.

All the scheduled property is situated in the Wards of Farringdon Within and Aldersgate, and within the parishes of St. Anne and St. Agnes; Christ Church, Newgate-street; and St. Botolph Without, Aldersgate. Around and about the ground to be acquired are certain disused graveyards, being those of Christ Church, to the north and west; of St. Botolph, to the north; whilst to the east and north lies that of St. Leonard, Foster-lane. This last now forms a private garden; a pretty little plot of well-cultivated land, immediately behind the central Money-Order Office (formerly the site of Magpie-alley), through which it is approached. St. Leonard's parish church was founded * within the precincts of St. Martin's Collegiate Church to serve the residents therein. St. Leonard's parish and the collegiate precincts were coterminous. The site of the church, nearly opposite to St. Vedast's, has already been absorbed in the Post-Office buildings. Since these limits, however, will not be readily identified by the ordinary wayfarer, we should state that the area in question lies between St. Martin's-le-Grand and King Edward-street, east and west; and Bull and Mouth and Angel-street, north and south. Of the existing buildings within this space the most conspicuous are the Queen's Hotel, the Great Northern Railway Company's City Depôt at the Bull and Mouth, the French Nonconformist Protestant Church, and the Blue Coat School masters' three houses in King Edward-street. In the Guildhall Museum may be found two relics of Bull and Mouth-street. These are the two stone figures of the boy and girl from above the entrance to the former ward schools (Farringdon Within) in that thoroughfare; and a marble tablet inscribed,—

STEWKELEY'S
STREET,
1668.

It appears that, having been promised some property here by one Stukeley, or Stuckeley, the hospital governors called this street by his name; but, inasmuch as the promise was not kept, they removed the tablet and re-named the street under its *ci-devant* style. That name was derived from the Bull and Mouth Inn, at one time a leading coaching house in the City. As in the case of the Bull and Gate, or Bullogne Gate, in Holborn, the sign is most probably due to King Henry VIII.'s popular victory at Boulogne Harbour in 1544. This hostelry was famous, too, for its associations with the once persecuted Quakers. George Fox is said to have often preached here; and here in more troublous days Thomas Ellwood, who was then enjoying the friendship of Milton at his "garden house" in Jewin-street hard by, was arrested at a prayer-meeting, 26 August, 1662, and carried off to Newgate. Its later aspect as a coaching house is preserved for us by W. Watkin's engraving (1831) from a drawing by T. Hosmer Shepherd. Though they should both be rescued from destruction, we can scarcely expect that room will be made in the Museum for the big sign of the Bull and Mouth above the yard entrance in Angel-street; or for the lofty composition which is placed against the front of the Queen's Hotel. Surmounted by King Edward VI.'s bust upon a voluted pediment, beneath which is the hospital coat of arms,—this trophy includes the figure of a bull supported by festoons and some more or less appropriate adornments. Underneath is a tablet to record the two-fold capacities of Milon of Crotona. His feats of carrying a four-year-old heifer through the stadium at Olympia, and of then consuming his burden in a single day, are commemorated in a block-letter inscription that, accurately transcribed, reads as follows:—

Milo the Cretonian
An ox slew with his fist
And ate it up at one meal
Ye Gods what glorious twist

The original inn was on the south side of Bull and Mouth-street; its successor, the Queen's Hotel, dating from 1838, faces eastwards in St. Martin's-le-Grand. In Jacob Ilive's map of March 10, 1739–40, a "Quakers' Meeting" is laid down just east of the inn.

The Mourning Bush Tavern, since the New Post-office Coffee-house, in Aldersgate-street, together with its ancient vaults abutting against the City wall, is a thing of the past. But it is to be observed that along the southern sides of the St. Leonard and St. Botolph burial-grounds are yet to be seen fragments of the wall, its best portions being covered by the lean-to-shed in St. Botolph's graveyard. This graveyard stands over the former City ditch whereof the name is still retained for the play-ground beyond of the Blue Coat boys. Closely adjoining is the French Protestant Church across the boundary line between the two parishes of St. Botolph and St. Anne and St. Agnes. This church, covered by the scheme for demolition, together with a small portion of a certain warehouse, does not, be it noted, appertain to the hospital freehold.

As we shall show below, a French colony had settled here in Queen Elizabeth's reign. But this church was built, after Owen's Gothic design, in 1842, upon the pulling down of St. Mary's Chapel, in Threadneedle-street, upon the site of the much older St. Anthony's Hospital. The congregation succeeded to that branch of the church of French Protestants which had been enfranchised by Edward VI.'s charter of 24th of July, 1550. Originally composed of refugees who left France before the revocation of the Edict of Nantes, they should not be confounded with the German, Flemish, and other Walloon Protestants who represented the following of Jean à Lasco from Embden, and to whom the Dutch church, Austin Friars, was assigned. Their church, at Aldersgate, possesses a donative library of about 2,500 volumes on ecclesiastical and theological subjects, written chiefly in the French and Latin tongues, and including several books of considerable value and rarity. The Charity Commissioners have framed a scheme whereunder certain appointed trustees are charged with the maintenance, custody, and insurance of the library.

The Collegiate Chapel of St. Martin's-le-Grand dates from a very early period of our history. In his book, already cited, the Lord Mayor (Alderman Staples) says:—"That there was a building on the site of St. Martin's appropriated by the early Christians in our island to the worship of the true God is probable by the Bull of Pope Clement V. (A.D. 1307), reciting the church among those exempted from episcopal jurisdiction, because they were founded before bishops were ordained in this kingdom, and episcopal jurisdiction had been usurped over them in times of civil commotion." The story goes that *temp.* Edward the Confessor, in 1056, two Englishmen of repute, Ingelric, Earl of Essex, and his brother Gerard, re-endowed the existing chapel with large possessions for the maintenance of canons secular. The Conqueror gave them a confirmatory charter in the second year of his reign, when Ingelric, having lost his lordship over Essex, after the defeat at Senlac, came hither in retreat, and was appointed the first dean. Though placed within the later walls, the canons were always successful in resisting the repeated efforts of the Corporation to interfere with their privileges, comprising the oftentimes abused rights of sanctuary. King Henry VII. bestowed the deanery advowsons upon the Abbots of Westminster, who henceforth became Deans of St. Martin's. William of Wykeham signalised his tenure of the deanship by rebuilding the chapter-house, and nearly the whole of the church.

* The foundation is by some attributed to William of Wykeham, the then Dean. In Alderman Staples's "Notes on St. Botolph Without, Aldersgate," the founder's name is given as "Walter or William Kyrkeham," and the date as about A.D. 1236. This is 150 years before William of Wykeham flourished.

Under purview of the Act of Chantries, 1 Edward VI., the Crown gained possession of St. Martin's-le-Grand. The buildings were soon razed to the ground. But over the ruins arose another "Alsatia." This at once proved a highly-favoured resort, by reason not only of the surviving rights of sanctuary, but of the exemption from civic jurisdiction, and its consequent freedom in trade, which residence within the Liberty continued to afford. In Queen Elizabeth's days the inhabitants consisted for the most part of Scots, French, Dutch, and Germans,—all such "strangers" being able to ply their respective callings, as dealers and manufacturers, secured from interference on the part of the City authorities. Strype, and even later writers, bear testimony to the excellence of their wares, notably of the "St. Martin's" and "Boul" lace, a description of copper filagree work. The ground was cleared in 1818 for Sir R. Smirke's new General Post Office (from Lombard-street), constructed in 1825–29. Amongst the places removed were Dean's-court; Mouldmakers'-row; Bell, Three Crown, and Round courts; Horse-shoe-alley; George-street; New-rents; Dark-entry; and the Three Tuns Tavern. During the progress of the works the cellars of the Queen's Head Tavern were exposed, and identified as the church crypt attributed to William of Wykeham. Deeper down were discovered abundant remains, such as coins (one of Constantine), beads, lachrymatories, Samian ware, funeral urns, and the like,—all indicative of Roman occupation in London.

THE GREAT SEALS OF ENGLAND IN EARLY HERALDRY.

WE have no grounds for assuming that heraldic figures were known in the British Isles before the latter half of the twelfth century. The first great seal of our Crusading Richard gives us one of the first undoubted examples. It represents a lion rampant turned to the inner, or sinister, side of the shield, and we may take it for granted that the other half was similarly charged, thus placing the animals as combatant.

After the expedition to the Holy Land a second great seal was struck for Richard, charging the shield with three golden lions passant quadrant on a red field, and thus have they remained for seven centuries as "the lions of England."

All too soon comes King John to claim the great seal, and to hold it in his most unworthy hands, and then to pass it on to the long-lived Henry III., and thence it finds a noble holder in the person of warlike and illustrious Edward, who made the presence of the lions felt in the concluding days of the crusades amongst the defenders of the crescent. It is in this latter monarch's reign that the lions first appear charged on the bardings of his horse.

Again England's great seal descends to weak and worthless grasp, as the second Edward assumes it, while swayed by foreign and odious favourites, hastening to his terrible doom, and claiming our sympathy *alone* by this ending of his almost intolerable reign.

Strange and rapid are the vicissitudes of our Island's seal, and now we follow it with a feeling of relief, as another Edward comes forth to claim it, and in his good keeping to watch the lions of England through half a century of her greatest glory. And now the *fleurs-de-lis* of France appear quartered with them, showing the title of this great monarch to the French kingdom, through his natural descent. It was in this reign that a great improvement in the designs of the great seals was made, and it is generally acknowledged as the period of their greatest excellence; most elaborate architectural details were introduced, and the heraldic bearings become more interesting.

Richard II. made no alteration in the seal beyond putting his own name in the place of that of his predecessors, and the same remark will apply to Henry IV., but the latter afterwards added a second seal, perhaps the largest and most elaborate of them all, reducing the *fleurs-de-lis* to three in number, in accordance with the alteration that was made in France about this time. We might well expect gorgeous design for a monarch who revelled in "the pomp of heraldry," and had twelve personal badges.

With the accession of Edward IV. the roses make their appearance on the great seal, while Henry VII. brought in a rose on a branch, and Henry VIII. added a lion and *fleur-de-lis* to the obverse, and finally adopted a seal with designs from the Renaissance school.

THE PROPOSED "NATIONAL ART EXHIBITION."

To a letter to the *Times*, Messrs. George Clausen, Walter Crane, and Holman Hunt append their scheme for organising a National Art Exhibition which would, they think, meet the needs of artists in a more satisfactory manner than that in which they are met by the Royal Academy:—

NATIONAL ART EXHIBITION.

Programme.

First obtain guarantees for money to pay expenses before and during Exhibition. In the event of the Exhibition not being self-supporting the deficit will be met by a *pro rata* call on the money guaranteed,—*i.e.*, each guarantor will lose from the sum he guarantees the proportion that the deficit bears to the total amount guaranteed.

For example, if the total amount guaranteed is 500*l.*, and the deficit to be met is 100*l.*, each guarantor will lose one fifth of the sum he guarantees.

If the Exhibition pays expenses, the money advanced by the guarantors will be returned.

If there is a balance it will be carried forward to next Exhibition.

The functions of the Managing Committee (elected from and by the money guarantors) to be quite separate and distinct from those of the Artistic Committee, the latter to have the sole and only voice in selecting and hanging the works of art submitted to it.

When there are sufficient guarantors, a circular explaining the "movement" will be sent at once to the suffrage, and every effort made to advertise to voters and general public.

The suffrage to be as wide and as universal a suffrage of all ranks and conditions of artists as possible, without discrediting the suffragan voice.

Let us say every artist who in the last two years has exhibited a work of art in any of the principal exhibitions. Let us say for "principal exhibitions" the different widely-known existing art societies, and the exhibitions managed by the municipal corporations of the provinces.

The circular to be an explanatory programme, saying very distinctly that the voter to whom it is sent will have no pecuniary responsibility, and asking:—

(1.) That the voter will submit two works to the Selecting and Hanging Committee for exhibition.

(2.) That the voter will send in his name as a candidate for the Selecting and Hanging Committee.

(3.) That the voter will vote the names of twenty for the Selecting and Hanging Committee.

Then explain that these twenty will be chosen from a list of the names that are given in response to paragraph (2). That this list will be sent early next year.

Then early next year this list of names, collected as above, will be sent to the suffrage, and by its vote will be annually chosen the Selecting and Hanging Committee of twenty.

THE ELECTRIC STREET TRAMWAY AT BLACKPOOL.

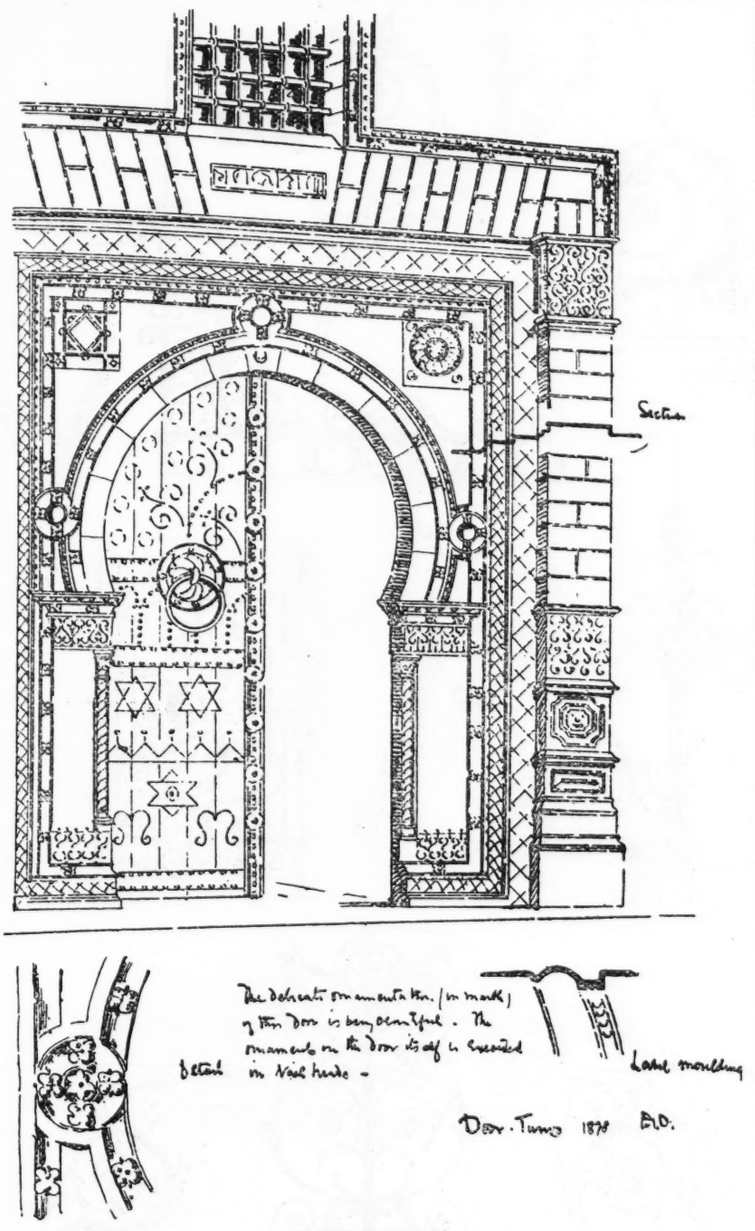
IN the Mechanical Science Section of the British Association meeting at Birmingham, Mr. Holroyd Smith, of Halifax, read a paper on an Electric Street Tramway, of which he has been the engineer, at Blackpool. He stated that the difficulty of applying electricity for tramway working lies in the fact that other vehicular traffic passes over the same road, and therefore the necessary conditions of safety to the public, and practical and economical efficiency, have to be considered. This is accomplished by constructing an underground channel in the centre of the track, having a narrow slit or opening in its surface for communication between the electric motor on the car and electric conductors within the channel. The general conditions are three,—(1) safety to the public, (2) efficiency, (3) economy. With some reservations the first condition may be accomplished by the employment of secondary batteries, which are destined to play an important part in the progressive development of electricity for tractive purposes; but it must be admitted that they occupy only a secondary place when it is shown that electricity can be used direct, and then can not only fulfil the first condition but the other two conditions also. The employment of rails as lead and return conductors is out of the question, for in large installations it must fail in regard to all three conditions. Side fence rails or overhead conductors, though fulfilling the conditions of efficiency and economy, are inadmissible for street purposes. There seems, therefore, but one course, and that is to place the electric conductors underground. Many carefully-worked-out details are necessary to carry this into effect. The channel is formed strong enough to support the ordinary traffic of the road, and so as to be easily flushed and cleansed. Its surface consists of steel troughing filled with wooden paving blocks, and forms a good roadway: the sides of the channel are partially formed of creosoted wood, holding porcelain insulators, which carry electric conductors of specially drawn copper, so formed that they can be readily and securely fixed, and the different lengths secured by expansion joints. Two conductors are supplied first, that they may be hidden under either side of the surface, and so be protected from injury by any substance falling through the slit in the surface of the channel; and, secondly, to make it possible to deal with points, loops, and crossings. Only the positive electricity passes along these conductors; the return is made by means of the rails, which are electrically connected one with the other. Communication is made with the cars by means of a collector which runs upon the copper conductors within the channel. Insulated copper bands, protected by steel plates, pass through the slit or opening in the surface of the road, and by a flexible insulated cord attached to an electrical terminal underneath the car, so that when the car moves the collector is drawn along with sufficient force to clear away any ordinary obstruction; but should an obsolute block occur, then a special clip releases the collector, and a breakage is avoided. From the terminal underneath the car the current passes to the switch-box, where the quantity and direction of the electricity to and within the motor is regulated, and thereby the speed and direction of the car are controlled. Switch-boxes are placed at each end of the car, and are provided with removable handles, without which it is impossible to operate them. The driver, who has charge of these handles, can cause the car to move backwards or forwards at will. From switches the current goes to the motor, and there produces mechanical energy. The motor running at a high speed, a combination of spur and chain gear is employed to communicate the power to the wheels and drive the car. The gear is specially designed to run smoothly and silently; from the motor the current passes by way of adjustable clips to the axle, and by them through the wheels to the rails and back to the station, where the electricity is generated. The electricity is generated at a station situated near the centre of the line. The engines and dynamos are in duplicate, and are capable of supplying a force of 250 volts and 300 ampères when required. The arrangements are such that the supply is equal to the demand,—viz., if one car is running enough current to drive it, and no more; if ten cars, sufficient for them. The practical success of the undertaking is proved by the continued working of the line. Nine cars run daily during the present season; they are always crowded, and most of the passengers ride the full two miles. Over 42,000 have been carried in one week of six days, there being no Sunday traffic. The cost of coal burned being under 5*l.*, gives thirty-five passengers carried the mile for a halfpenny worth of coal.

Mr. R. Horsfall, the chairman of the Blackpool company, said that for the last four weeks their receipts had been 330*l.* per week, and the cost of working had been 45*l.* They hoped to pay the cost of working during the winter, and to make a nice profit for the shareholders, during the summer. He believed there was a great future for electric tramways in this country if they were properly constructed; but the misfortune of the Blackpool line had been that it had cost for the two miles as much as 30,000*l.*

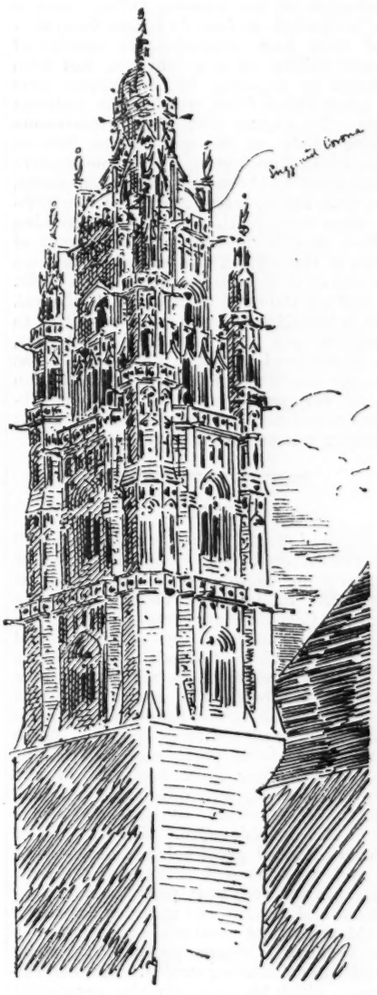
Captain Douglas Galton, speaking with reference to the Brussels and Antwerp tramways, said that they were worked by accumulators on the cars, and at first sight that system, if it could be shown to be economical, seemed to be preferable to others, because it did not involve a large outlay in plant or maintenance. But as yet the experiment in neither city gives much light.

Professor Perry said that the most valuable thing a mechanical engineer could go in for was the construction of a motor which should have no mechanical defects. The electrical engineer made his motor perfect electrically, but its nuts and keys were always getting loose.

Mr. Gisbert Kapp and other gentlemen having also spoken, Mr. Smith replied. He denied that accumulators could be economically carried, on account of their weight. He believed that there was great scope for the development of electrical tramways in towns.



DOORWAY, TUNIS.



TOWER, RODEZ CATHEDRAL.

From "Notes and Sketches of an Architect."

NOTES AND SKETCHES OF AN ARCHITECT.

UNDER the above title Mr. Archibald Dunn has produced a very pretty and interesting quarto volume* of architectural sketches, some of them of rather out-of-the-way work. We give reproductions, by the author's permission, of two of the sketches, showing the kind of thing that is to be found in the book. Mr. Dunn is desirous it should be distinctly understood that these sketches are given simply as sketches, "facsimile reproductions by photolithography of work done on the spot." We find, however, from another sentence of the preface that many of the sketches, originally in pencil, were traced in ink for photolithography. That was unavoidable, but we may point out that this is not exactly the same thing as a facsimile of a sketch "finished on the spot." However, the book contains a good many freely-sketched bits which are suggestive to glance over. The tower of Rodez Cathedral is an example of the more rough and free sketches in the book, and the sketch of the door at Tunis one of the more finished ones.

* Notes and Sketches of an Architect. By Archibald M. Dunn. A collection of sketches made in England, France, Germany, Italy, Spain, &c., and also in Eastern countries. Andrew Reid: Newcastle.

MICRO-ORGANISMS IN WATER AND AIR.

IN the Biological Section of the British Association meeting at Birmingham, on behalf of Dr. Frankland (London) an abstract of a paper on "The Multiplication and Vitality of certain Micro-organisms, Pathogenic and otherwise," was read by Professor Ward. In this paper the author recorded a number of experiments which he had carried out on the multiplication of the micro-organisms present in natural waters, and also on the vitality of certain pathogenic organisms when purposely introduced into similar media. These phenomena had been studied by aid of the method of gelatine-plate cultivation, originally devised by Koch. The first part of the paper treated of the influence of storage in sterilised vessels upon the number of micro-organisms present in the unfiltered water of the rivers Thames and Lea, in the waters of these rivers after sand filtration by the companies supplying the metropolis, and in deep-well water obtained from the chalk. Of these three different kinds of water, at the time of collection the unfiltered river-waters were the richest in micro-organisms, containing as they did several thousand microbes, capable of being revealed by plate cultivation, in one cubic centimètre of water, whilst the filtered river-waters had this number generally reduced by about 95 per cent., and the number present in the deep-well water rarely exceeded 10 per cubic centimètre. On storage in sterilised vessels at 20° C., however, a great change in the relationship of these numbers soon took place, for whilst the number of organisms in the crude river-water underwent but little change or even suffered diminution, that in the filtered river-water exhibited very rapid multiplication, and that increase was even still more marked in the case of the deep-well water. The author suggested that the differences in the rate of multiplication exhibited by those three kinds of water was dependent upon the number of different varieties of micro-organisms which they contained. Thus in the unfiltered river-waters the organisms belong to a number of different kinds; the filtered river-waters exhibited fewer varieties; whilst in the deep-well water the number of varieties was still more limited, the gelatine-plates having generally the appearance of almost pure cultivations. The microbes in the deep-well water would thus be less hampered in their multiplication by hostile competitors than those in the filtered river-waters, and these again less than those in the crude river-waters, in which an equilibrium must have already been established between the various competitors. The author pointed out how necessary it was that each pathogenic organism should be made the subject of separate investigation, and how fallacious must be any generalisations concerning the vitality of pathogenic microbes which were based upon the study of a single form.

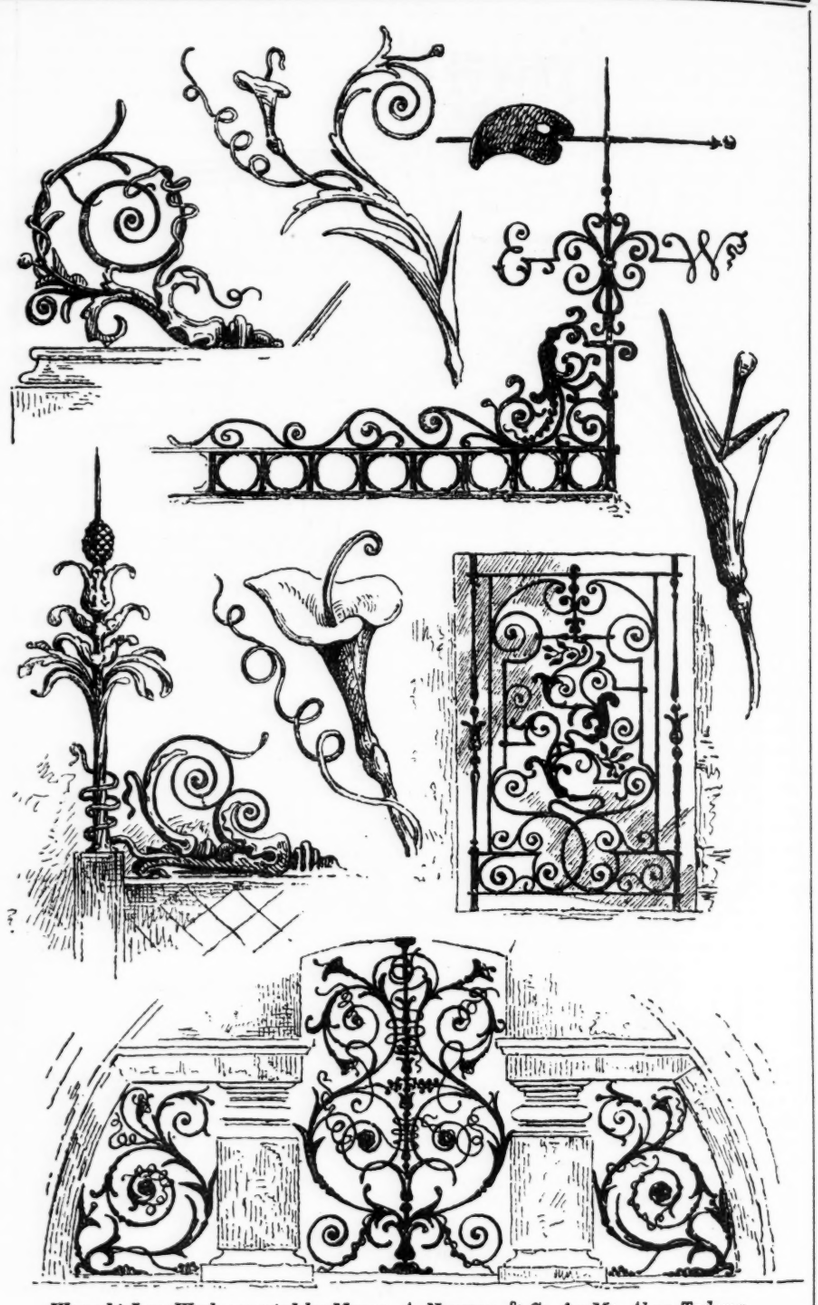
Dr. Frankland also contributed a paper on

the distribution of micro-organisms in the air of town, country, and buildings, which contained the results of a number of experiments which the author had made on the relative abundance of micro-organisms in the air of different places, and of the same place at different times. In these experiments the number of microbes contained in a given volume of air had been supplemented by the determination of the number falling upon a unit of horizontal surface (1 square foot) in a unit of time (one minute). The number of organisms falling on a given area had been determined by exposing for a definite time small glass dishes filled with sterile nutrient gelatine. The greater part of the experiments had been made on the roof of the Science Schools, South Kensington, whilst comparative determinations had been made in various places, both in town and country. A number of experiments were made with a view to determining the effect of altitude upon the abundance of microbes in the air. These experiments were carried out at various stages on the dome of St. Paul's and on the spire of Norwich Cathedral. The air in buildings had also been submitted to examination, and the fact established that, whilst in enclosed spaces in which the air was at rest, the number of microbes in suspension might be very small, yet when aërial disturbance was occasioned by persons moving about the number was enormously increased.

OBITUARY.

Mr. Rowland Mason Ordish, whose name will be well remembered by many of our readers as an authority on ironwork, died last Sunday at his residence in Camden Town. When in practice in Great George-street he was constantly being consulted by architects and engineers on questions of detail. His courteous manner, and his readiness at all times to give information to those who would take the trouble to consult him, won for him a reputation as a kind friend and a willing adviser. There are numbers of his old pupils now about Westminster, and holding good positions in the country and abroad, who owe their practical knowledge of ironwork to the experience gained in Mr. Ordish's office. He was one of those who attached great value to neatness of work, and was himself both an excellent draughtsman and very neat penman in writing dimensions and descriptions upon his drawings. He could appreciate mathematical work, but always preferred, where possible, to work graphically in calculating strains. Among the works with which his name remains associated we may mention the St. Pancras Station Roof, the restoration of the roof over the Chapter House at Westminster, the Leeds Infirmary Winter Garden Roof, the Albert Hall Roof, the Albert Bridge over the River Thames at Chelsea, the Franz-Joseph Suspension Bridge over the Moldau at Prague, the Singapore Bridge, the Czernowitz Bridge, Watson's Building, Bombay (an hotel constructed of cast-iron); the Wellington Pier, Bombay; the Nictheroy Gasworks roof, Brazil; the Derby Market-hall, the Derby drill-shed, the Farringdon-street bridge of the Holborn Viaduct, the widening of the Victoria railway bridge over the river Thames at Battersea, and the various railway bridges over the roads and railways in the immediate vicinity upon the Surrey side; the Amsterdam station of the Dutch Rhenish Railway, and the Amsterdam Exhibition. The Dublin Exhibition roof, now re-erected at Battersea, was also due to his genius. These works, which are not here given in order of date, show a variety and extent of work which rarely passes through the hands of one man. In his early days Mr. Ordish was engaged upon the Great Exhibition of 1851, and also that of 1862. Mr. Ordish spent a large amount of his spare time in advocating the construction of a low-level Tower Bridge, and in advocating a scheme known as the North-Western and Charing-cross Railway, which involved the construction of new thoroughfares between Oxford-street and Charing-cross.

A Statue of St. Winifride (life-sized), designed by Mr. Kirby, architect, of Liverpool, and executed by Mr. R. L. Boulton, of Cheltenham, has been erected at St. Winifride's Well, Holywell, under the carved canopied niche which has been empty for several centuries.



Wrought-Iron Work executed by Messrs. A. Newman & Co. for Mr. Alma Tadema, from the Designs of Mr. Tadema.

WROUGHT-IRON WORK AT MR. TADEMA'S STUDIO.

THE accompanying sketches, supplied by Messrs. A. Newman & Co., represent some wrought-iron work which has been executed at Mr. Newman's forge for Mr. Alma Tadema's studio at Hampstead, under the superintendence and mostly from the designs of the latter, though Mr. Tadema tells us that Mr. Newman may fairly claim the whole credit of the designs for the weathercock and its belongings, and for the grill panel on the right, which were designed by Messrs. Newman and approved by Mr. Tadema.

The details, as will be observed, show a greater degree of naturalism than is habitually used in wrought-iron design.

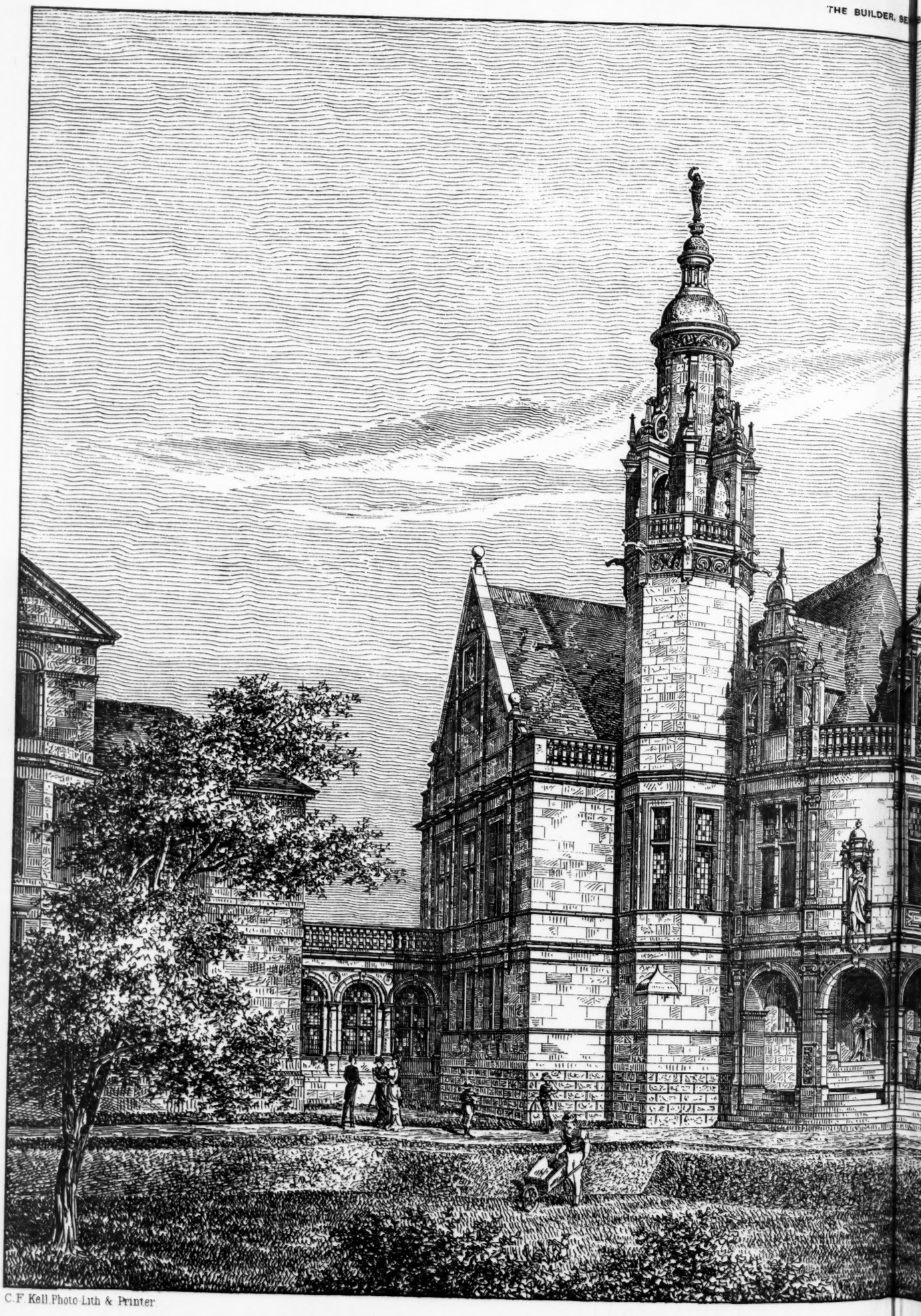
Illustrations.

THE MAPPIN ART GALLERY, SHEFFIELD.

THE late Mr. John Newton Mappin left to the town of Sheffield a valuable collection of modern paintings, and a sum of 15,000*l.* to provide a building for their exhibition.

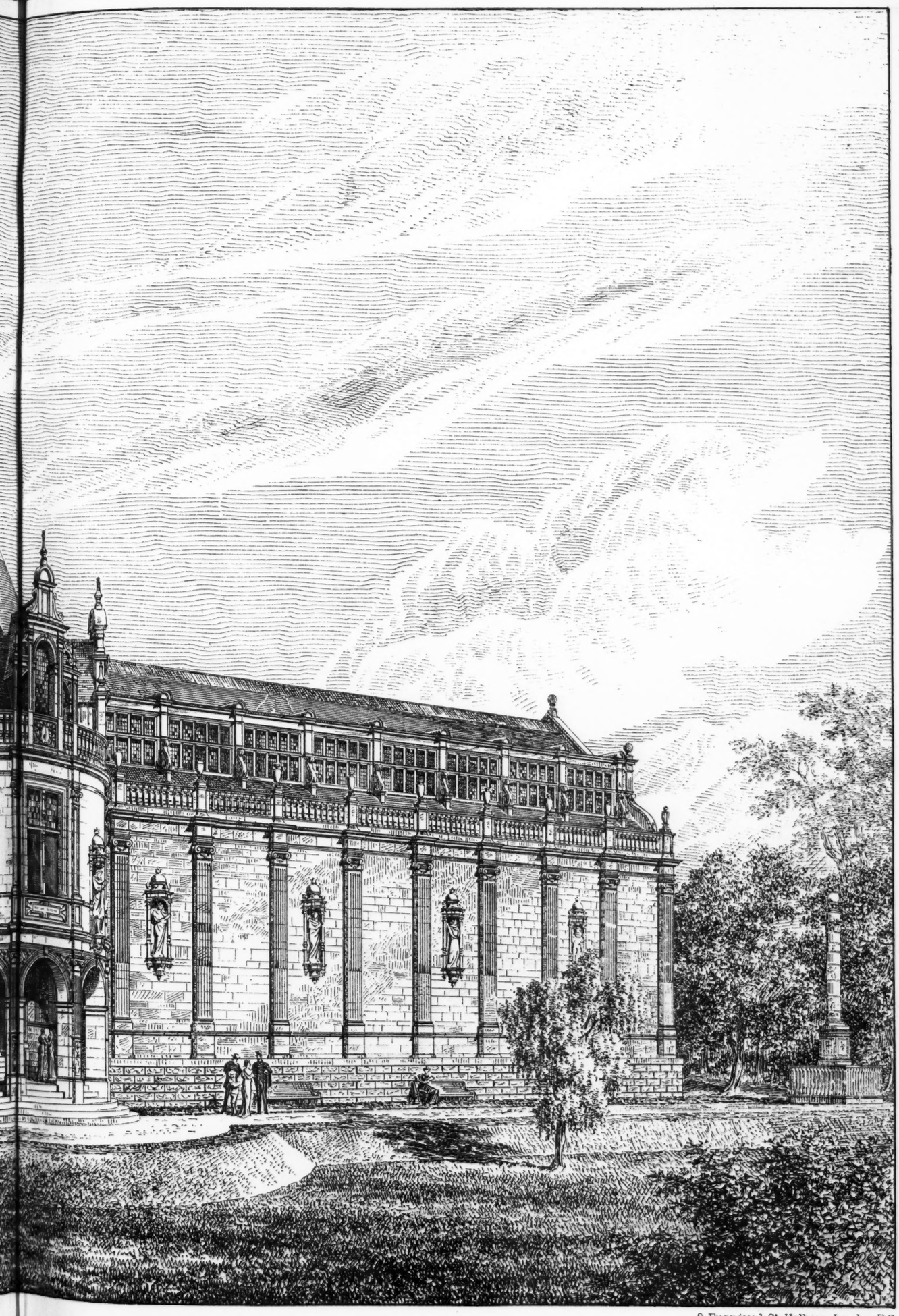
The refined and beautiful design which we illustrate by three views this week was submitted in public competition for this building by Mr. J. D. Webster, who describes his object in the preparation of the design to have been the provision of adequate space for Mr. Mappin's collection and reasonable accommodation for the temporary exhibition of other collections, rather than the provision of a larger number of galleries at the expense of the architecture.

Our double-page external view is taken from a delicate and pretty drawing, which was hung in a good position this year at Burlington House. The semicircular portico projecting from the side of the building leads through a small vestibule to a hall, 35 ft. long by 28 ft. wide, from which on the right the principal gallery, 100 ft. long by 35 ft. wide, is entered; both of these are of the full height of the building. On the left of the hall are cloak-rooms and lavatories, and in the rear, not seen in the view, is a large gallery, 60 ft. by 35 ft., for loan collections. A corridor of three bays, seen on the left, affords communication with the Weston Museum. Over the portico and cloak-rooms, and reached by a small staircase in the tower, are galleries for drawings, &c., open to the hall, as is shown in the interior view of the latter. The other interior view, of the Mappin Gallery itself, shows the admirable method of lighting proposed.



C.F. Kell, Photo-Lith & Printer.

DESIGN FOR THE MAPPIN ART GALLERY, SHEF



8, Furnival St Holborn, London, E.C.

Y, SHEFFIELD. By Mr. J. D. Webster, F.R.I.B.A.

Wyman & Sons, Photo-Litho. C^t Queen S^t London, W.C.

DESIGN FOR THE MAPPIN ART GALLERY, SHEFFIELD: INTERIOR VIEW.

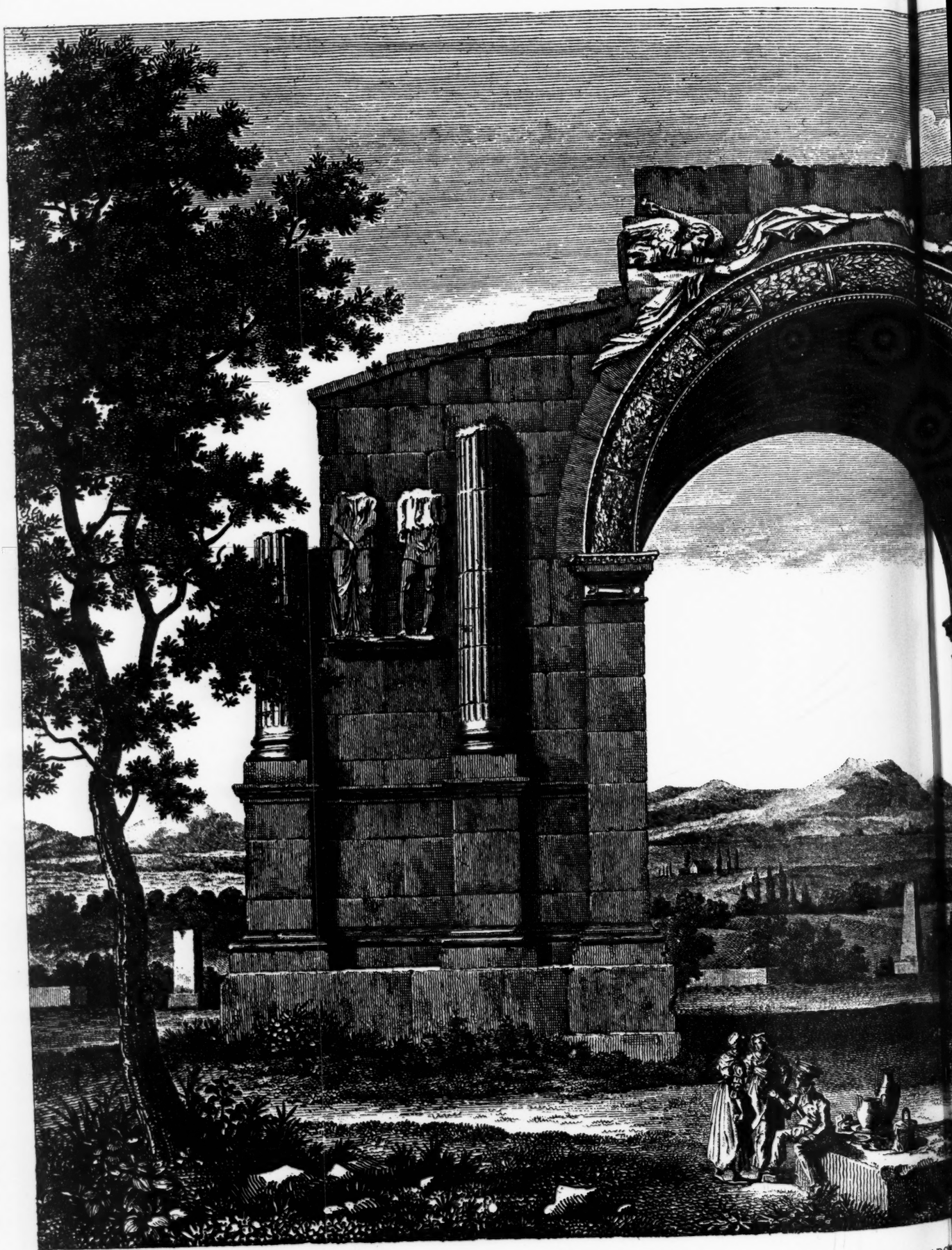
By Mr. J. D. Webster, F.R.I.B.A.

Wyman & Sons, Photo-Litho

Ct Queen St London, WC.

DESIGN FOR THE MAPPIN ART GALLERY, SHEFFIELD: THE ENTRANCE HALL.

By Mr. J. D. Webster, F.R.I.B.A.



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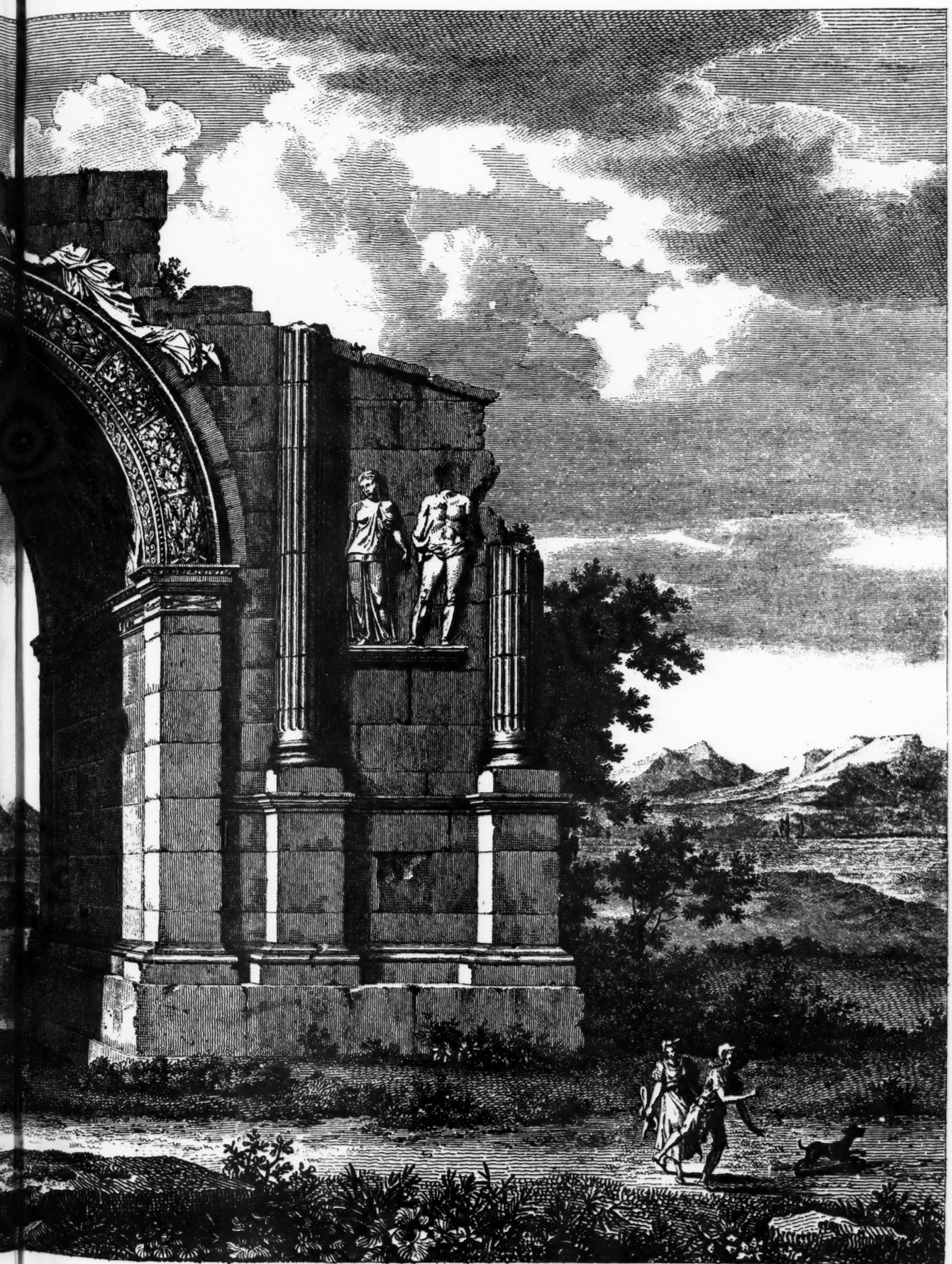
THE TRIUMPHAL ARC

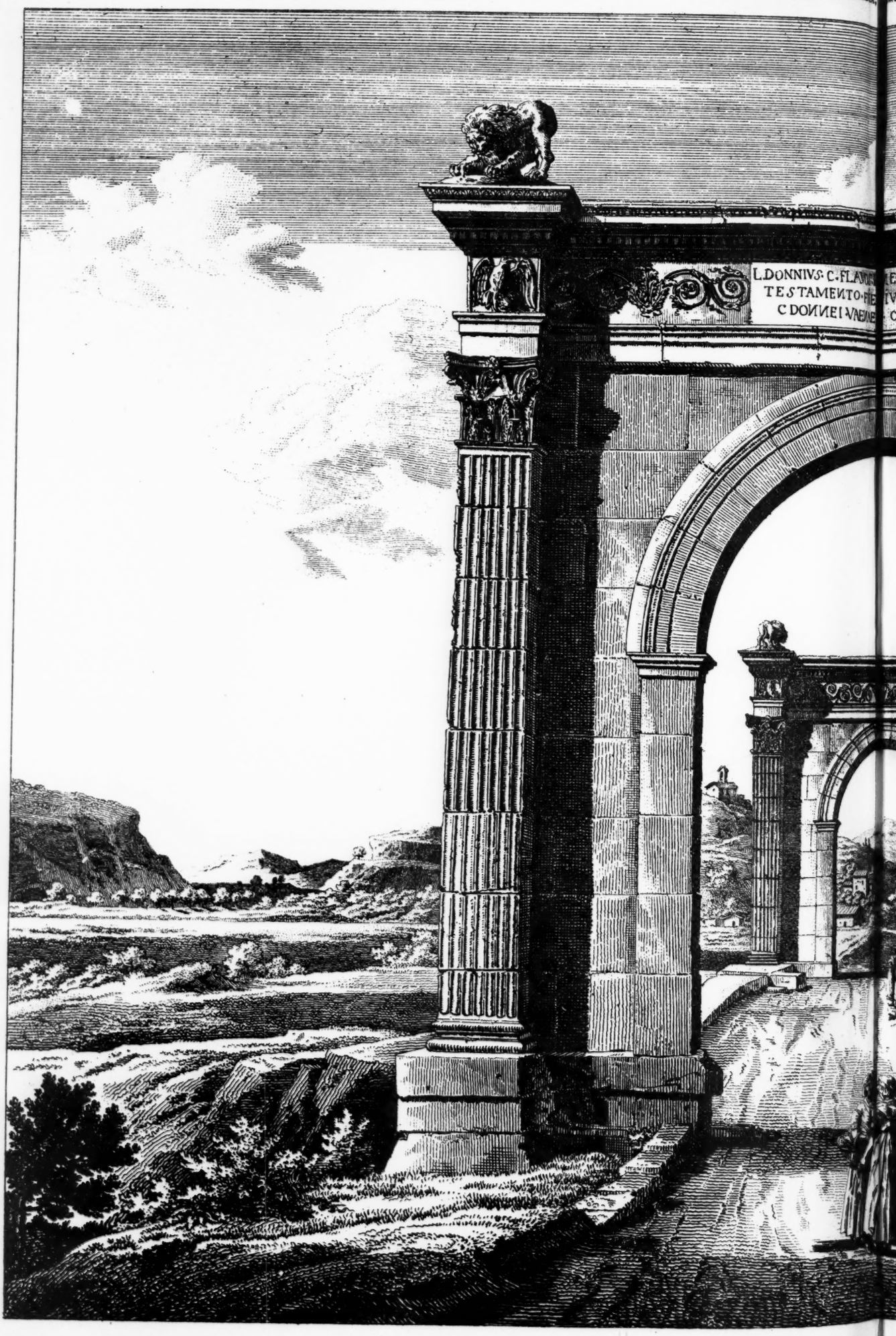
ARCH AT ST. REMI, PROVENC



RCHES OF THE ROMANS.

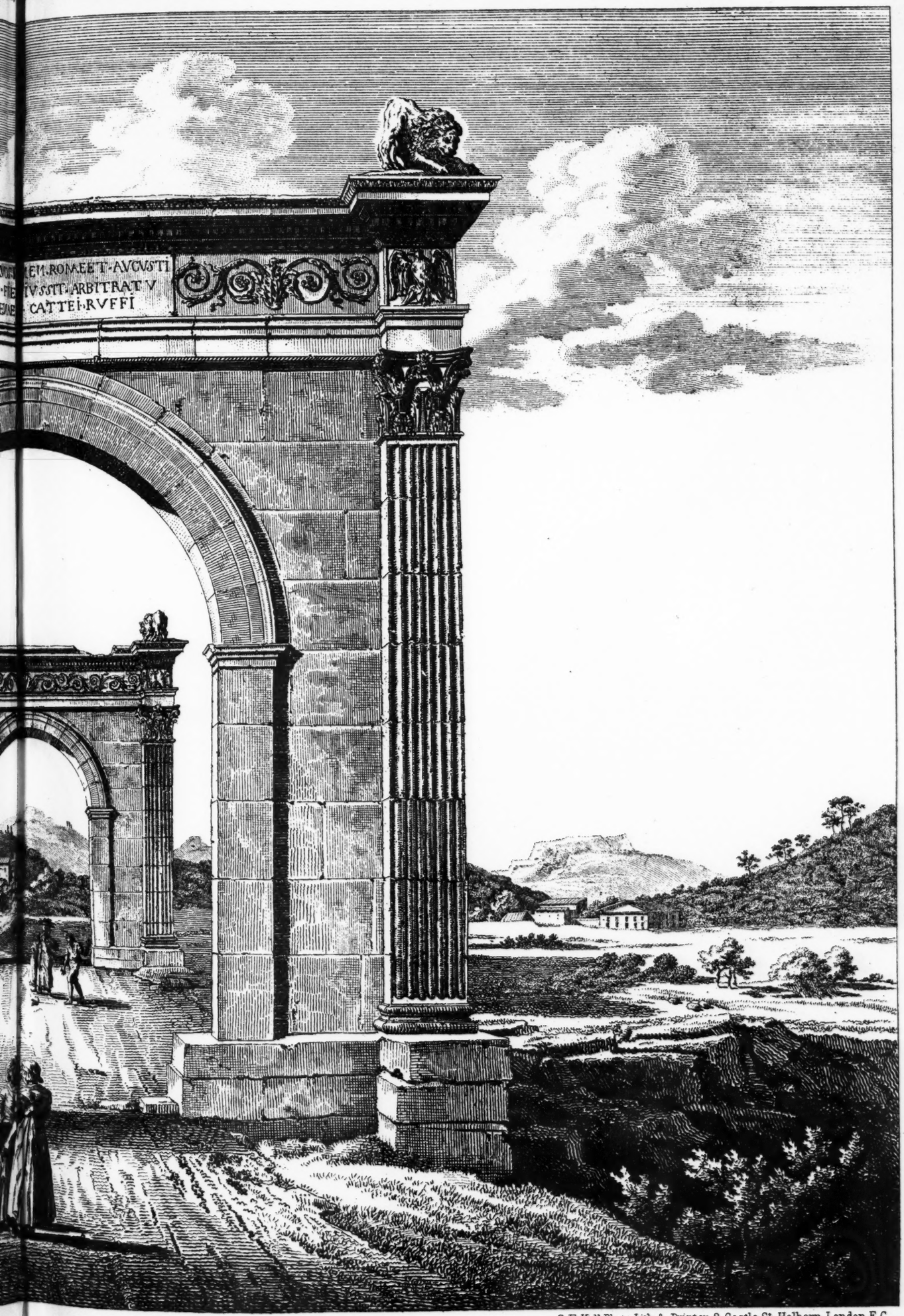
From an Engraving by Baltard.

8, Castle St Holborn, London, E.C



THE TRIUMPHAL ARCHES

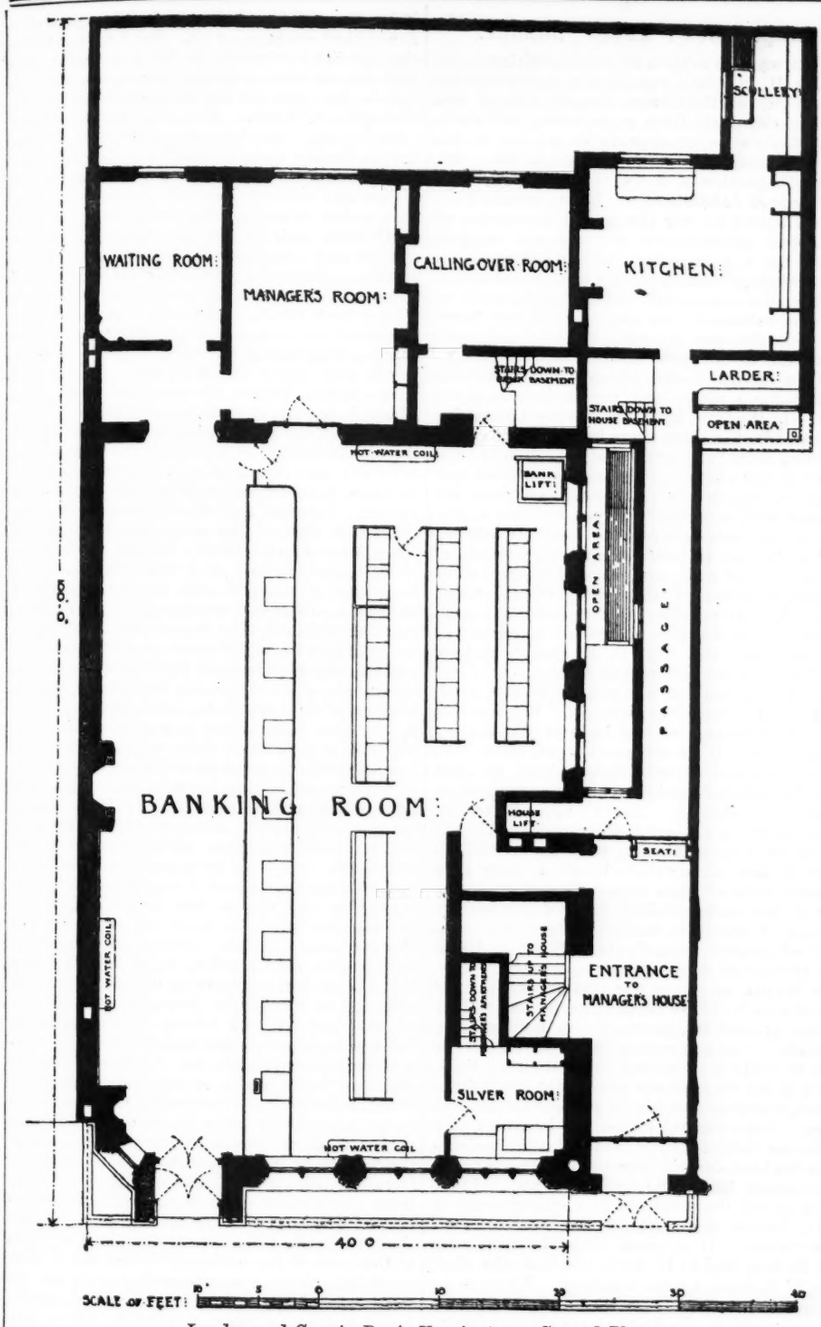
ARCHES AT THE BRIDGE OF ST. CAMA



C. F. Kell, Photo-Lith & Printer, 8, Castle St Holborn, London, E.C.

ARHES OF THE ROMANS.

T. CAMAS. *From an Engraving by Bance.*



London and County Bank, Kensington.—Ground Plan.

THE NEW LONDON AND COUNTY BANK, KENSINGTON.

WE append a plan of this building, a view and description of which we gave last week. Mr. Alfred Williams is the architect.

CANAL COMMUNICATIONS.

THIS was the subject of a paper read by Mr. S. Lloyd in the Economic Science and Statistics Section of the British Association meeting at Birmingham last week. After giving a history of canal navigation from the earliest times down to 1846 the writer proceeded:—In that year England was under the influence of a railway mania, and canal undertakings were discredited and looked upon as no longer of much use, except locally as feeders to railway companies. Many canal proprietors participated in these views, and allowed their undertakings to be leased and taken under railway control, until in 1870 the disadvantages resulting to the country became so manifest that a return was ordered of the canal mileage acquired by the railway companies, when it was found that out of the total length of canal and river navigations of England and Wales, amounting to 2,437 miles, 1,306 miles had passed under their control. These companies managed the canals to suit their own purposes, and the traders and the public generally complained so strongly that their interests were sacrificed that in 1872 a Joint Committee of the House of Lords and House of Commons sat to consider the subject, who reported as follows:—"1st. That no inland navigation now in the hands of a public trust shall be transferred to or placed under the control of a railway company. That if the trustees of an inland navigation or a canal company apply to Parliament for power to purchase compulsorily a canal from a railway company, such purchase shall be favourably considered by Parliament. 2nd. That the utmost facilities shall be given for the amalgamation of adjoining canals with one another or with adjoining inland navigation." The continued unsatisfactory condition of many canals, especially of the 1,306 miles under the control of railway companies, led in 1883 to the appointment of a Select Committee on Canals. It sat for four months, and much valuable evidence was brought forward, which is published in a Blue Book of 331 pages. We have seen how unavailingly the Earl of Chatham endeavoured to have national attention given to canal construction. From that day to this successive Governments have sadly neglected it, so that in Mid-England we now find ourselves in the year 1886 with mere mud ditches to the ports. This was forcibly brought out in evidence before the Parliamentary Committee in 1883, when Mr. E. J. Lloyd, who acts in the triple capacity of engineer, general manager, and secretary to the Warwick canals, stated that the canals between Birmingham and the ports were, as a matter of fact, enlarged ditches, 5 ft. in depth, with a top water of 30 ft., and inclined slopes of mud on each side, which have a constant tendency to silt and fill up the bottom. It was impossible to make use of them for steam power. The Grand Junction Canal had tried to do so, but had failed, and had sold their steam boats. This state of things had led to a virtual monopoly on the part of the railway companies, so that in October last, in answer to the question issued by the Royal Commission on Depression in Trade, "Are there any special circumstances affecting your district to which the existing condition of trade and industry there can be attributed?" the Birmingham Chamber of Commerce replied:—"The exorbitant cost of carriage of goods from Birmingham to the seaboard which has placed inland districts at a great disadvantage compared with maritime towns." Birmingham and South Staffordshire object to pay higher rates than any other district. To enforce them may not prove to the permanent advantage of the railway companies, as it tends to cripple trade and seriously lessen the carriage of goods. In illustration, one out of many cases may be given. Messrs. Hudson & Son, the well-known washing powder manufacturers of West Bromwich, had, like many others, occasion to complain. They told the railway companies that they should go to Liverpool if the exorbitant charges were not abated. Their remonstrances were unheeded. They removed, and commenced to send their goods by sea to London, when the London and North-Western Railway Company agreed to carry them at a less rate from Liverpool to London than they had been charging from West Bromwich to London, although the distance was nearly double. Numerous cases like this have tended year by year to depress and diminish the prosperity of the district. As the Belgians have given their manufacturing centre the advantage of a 2s. rate to Antwerp, 105 miles distant, and to distant German works one of only 7s. 6d. per ton, is it too much to expect that England should permit its most inland manufacturing centre to acquire similar advantages? The corresponding rate from South Staffordshire to London would be 3s. a ton, exclusive of lock dues. The evidence brought before the Select Committee on Canals in 1883 proves conclusively that goods may be conveyed as cheaply in England by water as on the Continent; for instance, on the Weaver, in Cheshire, salt is conveyed a distance of thirty miles for 6d. a ton, equivalent to a rate of 1-8th of a penny per mile, which is even lower than between Liège and Antwerp. But this is not a solitary instance. Mr. Bartholomew, the general manager of the Aire and Calder Navigation, stated that he found the cost of transit was as low as 1-34th of a penny per ton per mile, after allowing 10 per cent. for depreciation of capital and all repairs. Mr. E. J. Lloyd stated that traffic could be transported from Birmingham to London by an improved canal system at a wharf to wharf rate, made up as follows:—150 miles toll, at 1-5th of a penny per mile, for maintenance and interest upon capital, 2s. 6d.; haulage, 1-10th of a penny per mile, 1s. 3d; boat-hire, depreciation of plant, and terminal agency, &c., 9d.; total 4s. 6d. That this rate of 4s. 6d. per ton would be profitable between the two great commercial centres of London and Birmingham upon a canal system adapted to the advantageous use of steam power can be irrefutably proved; also that the ordinary heavy merchandise of the town and district could be loaded at the various works and shipped in the port of London at an average rate not exceeding 7s. 6d. per ton. In 1846 the London and North-Western Railway Company arranged to guarantee a dividend of 4*l.* on each share of the Birmingham Canal Company. The Chairman of the London and North-Western Railway Company, in his speech at the half-yearly meeting of proprietors, held last month, said,—"The most unfavourable item we have in the accounts is that relating to the Birmingham Canal traffic. We guarantee 4 per cent. on the capital of that company. We made a loss of 15,000*l.* written off this half-year. . . . . I do not see what is coming to pass in that district. A few years ago it was reckoned that there had been 148 blast-furnaces built, but to-day there are only twenty-seven in blast."

Others like Mr. Moon do not see what is coming to pass. The London and North-Western Railway Company have had the canal for forty years, but nothing appears to have been written off for depreciation. If this had been done annually the capital would probably have been reduced to its value, and the trading would not have appeared so unfavourable. The company charge 1½d. per ton on goods conveyed by the canal to the railway stations, and subsidise themselves and other railway companies to the extent of 5d. a ton or more out of the canal revenue,—at least, so it is reported,—while a neighbouring canal company complain that if the goods are passed to other canals the toll averages 10d. a ton. If Mid-England is to enjoy the advantages of cheap water communication to the ports, and thus be enabled to send its manufactures abroad at a cost that will leave a margin of profit beyond the cost of production and delivery, it is essential that a trust under Parliamentary powers should be obtained for the purpose. A joint-stock company would not avail, as its aim would be to exact the highest tolls possible, and it would soon act in compact with existing railways. The estimated cost of improving the Severn route is 600,000*l.*, and merits attention especially on account of the rising importance of Cardiff and Newport as great shipping centres. The improvement of the route to London should be first carried out. A trust should be formed by the towns of the district, and the State should be asked to advance the money at a moderate rate of interest to the local authorities, if at 3 per cent. this would leave the Government a margin of ½ per cent. beyond the interest paid to savings bank depositors. The canal rates should be fixed so as to yield a clear ½ per cent. after payment of the interest on the Government loan and the expenses of working and maintenance; this ½ per cent., if invested by the trust at 3 per cent. per annum compound interest, would in a period of sixty-six years extinguish the loan, and the whole undertaking belong to the towns and district represented by the trust. We have a precedent in the Act for Granting Loans in aid of Public Works, under which a loan of 60,000*l.* was made in 1817 to assist the construction of the Gloucester and Berkeley Canal, the final balance of which was paid off in 1840, with 3 per cent. interest. The coalfields of Warwickshire and South Staffordshire are supposed to be one vast field. However this may be it is certain they will last for centuries. They are the nearest to London, and the annual consumption of coal in the metropolis is now nearly eight millions of tons. It is estimated that the improved canals would convey 10 per cent. of the amount required. This, in addition to the large traffic low rates would attract, would ensure the success of the trust, and make it a source of profit to the towns interested.

Mr. E. B. Marten also read two papers on the history of the Birmingham and Stourbridge Canals.

The Mayor of Birmingham (Alderman Martineau) said this happened to be a question to which he had given some attention, and he could confirm what had been said as to its extreme importance to this neighbourhood. No doubt they had been suffering in Birmingham from the want of this improved water communication to convey their goods to the seaboard. Birmingham was the furthest town from the seaboard of any place in England, and when they compared their rates with those towns which had the advantage of water communication they found themselves at a great disadvantage, and he mentioned that there were cases where a large amount of employment for the industrial classes was likely to be taken away and given to places with better waterways to the coast. England was falling behind continental nations in this respect, and this might result in giving a great advantage to French and other foreign manufacturers. English railway companies had been allowed to choke their canals, and it was time that something was done to retrace their steps in the matter. It had been clearly shown that there were no engineering difficulties in making a cheap route to the Severn.

Mr. G. W. Hastings, M.P., said that in Worcestershire they wanted larger and more direct canal communication with the seaboard. He approved of the project which had been started in Birmingham, and if he could help to further it he should do so. He thought the best method would be to run into the canal at Droitwich, which ran into the Severn.

ABBOTSBURY ABBEY, DORSET.

THIS was the subject of an interesting paper by Mr. H. J. Moule, read by him on the occasion of the visit of the Dorset Natural History and Antiquarian Field Club to the abbey last week. Mr. Moule's paper appears *in extenso* in the *Dorset County Chronicle* for Sept. 16. We extract a portion of it:—

"Here at Abbotsbury we by no means have to call wholly on our theoretical knowledge of Mediæval architecture and on our creative fancy for a presentment of the abbey. . . . . The buildings remaining are the great barn, a portion of an important edifice a little north of its west extremity, the east wall of the farmhouse-garden, and the stable attached to it. All these are on a lower level than the sort of plateau on which the Abbey Church and its surroundings stood, and my impression is,—I do not in the least insist on it,—my impression is that, like the barn, these two other masses of building were for purposes of less dignity than those on the plateau. These latter,—this upper group in position and dignity,—are 'the old Pynion end,' so-called locally, a building south-east of the parish church, and now a workshop and stable, an isolated archway, remnants of the gatehouse arch, and last and chiefest some recovered bases of the Abbey Church north wall. Let us consider this upper group first. I believe that it is to a request or suggestion of the late vicar, the Rev. G. H. Penny, that we are indebted for the partial uncovering of the base of that wall, on which is built the south wall of the parish churchyard. We can see the lower courses of five bays of the eastern part of the wall of the north nave aisle. We see the cheeks of five windows with dropped sills for benches, and bases of vaulting, or at least roof shafts. These appear to be fifteenth-century Third Pointed work. The tile pavement, too, remains in part at least under some inches of earth. What I have seen appears to be of plain tiles. Then there is one bay of the corresponding part of the western portion of the nave visible. There are bases only of smaller subordinate vaulting shafts of the thirteenth or fourteenth century. Now, how far can we trace the rest of the plan of the church? Little enough, as far as the look of the ground is concerned,—in midday light, at least. I greatly regret that I have not been able to study the spot in a low but strong light. Then is the time to see the slight inequalities which sometimes enable us to trace old foundations. But a careful inspection in even a high light has helped a little, and not a little assistance has been derived from the late vicar's notes, most kindly lent to me by Mrs. Penny. These notes record the results of excavations made in 1871, before the visit of the Archæological Association. It appears that the nave was 192 ft. long and 54 ft. wide, and that the choir was 27 ft. wide, length unknown. There is no sign of transepts. There seems to have been a chapel, perhaps the Strangways chantry, opening from the north-east part of the nave. We may conjecture that the 13 ft. 6 in. narrowing of the chancel on each side, as compared with the total width of the nave, represents the width of the north and south aisles of the latter. Mr. Penny shows foundations of two buttresses of pretty bold projection, perhaps enough to allow us to imagine them to have carried flying buttresses and therefore a vaulted roof. But this is mere speculation. I think that what I have said tells us all we actually know about the Abbey Church, except that signs of a south door towards the east end of the nave have been detected. With this certainty as to the general site of the Abbey Church on the northern extremity of the convent precinct, and the certainty as to the vast existing barn on the southern boundary thereof, our certainties as to the buildings unfortunately come to an end, and we cannot call to our aid arguments from the normal Benedictine plan, which Lübke says was to group the buildings round the church. Here that could not be, the church, as we have seen, being at the very northern edge of the precinct. I may remind you that the refectory at Benedictine Milton is north of the church, and so are the remaining buildings at Benedictine Sherborne. Here at Abbotsbury all has to be looked for south of the church. It seems to me just possible to trace a square, of about 65 ft. each way, south of the western half of the nave, which may be the area of the cloisters. It is difficult to reconcile with this idea the isolated remaining archway, forming part of a demolished enclosing wall. But I do not think that we need reconcile it, for I consider that arch not to have belonged to the abbey at all, but to be part of the precinct of the later Strangways House. Now, to speak of the 'Pynion end,' the high fragment with ivy on it. In Buck's view, dated 1733, this gable has fragments of the side walls attached to it, and a two-light Second Pointed window in each, with a low arch showing below that on the south side, and, indeed, the sill of the south window and a springer of the arch below it yet remain. From the look of those upper windows, and from the chimney and fireplace on a level with them, I conjecture that this was the refectory, with cellars or other storehouses below. There is a sign of a ledge or set-back in the wall below the windows. This might have carried beams for the refectory floor. There is a curious little stone, panelled in an odd way, in the chimney back. The dwelling of the monks would be adjoining the church, the refectory, and the cloisters, and I imagine them to have been on the east side of the cloister square. Possibly the abbot's lodging was on the south side of the same, reaching to the steep descent to the pond. Of this upper group of buildings, spoken of a little way back, we have still to consider only the last, that now used as a stable and workshop. It has been a building of dignity and importance, judging by the excellent Second Pointed two-light window, arched, with a six-cusped light in the head, in the north wall. Adjoining is a square-headed window of the same date, and also good. And in the east gable there is a very queer little window only a yard each way. It is square headed, without hood moulding or any reveal. It contains eight tiny lights in two ranks, each light arched and trefoiled at top. To my eye it seems a very curious window, and probably of the fourteenth century. Now, what was this building? It stands in a position suitable for the chapter-house, and I venture to suggest that use. It was a not uncommon thing, to say the least, to have an altar in the chapter-house. That curious little window, facing east, may possibly have had the altar below it, or perhaps forming its sill. But I am ashamed to wander in this wilderness of conjecture, and in now taking up the buildings below the plateau, above spoken of, vague conjecture still surrounds us. I dismiss the traditionary assignments of the dormitory, brew-house, and malthouse, believing the two latter to be most likely parts of the monastery converted to those uses in Strangways' times, and the first to be unlikely, to say the least of it, from the distance of any of these buildings from the church. To begin with the dairy-house. The large blocked-up arch in it suggests that it was the gatehouse of the abbot's garden at the back of it. I cannot indeed see or hear anything about a corresponding arch on the west side of the house, to prove a thoroughfare, but that side seems to have been altered and added to. If a gatehouse, it might be the dwelling of a lay brother in charge of the fourteen-acre garden,—the best bit of land in Dorset, I have heard,—and of the fishpond supposed to have been there. The lay brother kept grand fires, judging by the great chimney in what is now the milk-house. Then, what of the building by the farmhouse, consisting now of a stable and the garden wall at right angles to it? The remaining work looks somewhat like part of two sides of a quadrangle. Now, I am ignorant of the general position and nature of the dwelling of the lay brothers of a monastery. But in one where, as probably here, much land was kept in hand, the lay brothers must have been pretty numerous, for I presume most of the farm work was done by them. Can this supposed quadrangle, adjoining probably the great barton, have been the lay brothers' abode? Or, again, it might be that and stables combined. I said that probably much of the abbey lands, within easy reach, were kept in hand. I judge by the stupendous barn, to which we now come in our survey. It is difficult to believe that that enormous building was required only for tithe corn and perhaps rent corn. It is and always has been in two divisions. May not one be for the corn received as above, and the other for the home estate corn? But let us think a moment not of the uses but of the structure of this 282-foot barn. Ashlar without, aslar within, of most seemly and noble fifteenth-century style, with the north porch and

the west gable specially admirable features, well would it be if all our churches were half as well designed and carried out. The buttressing of the west gable is a very bold and clever bit of architecture, the crenellated heads of the corner buttresses and the charming niche crowning the centre one all giving a finished and artistic air to the whole, quite wonderful in a barn. We may notice the same style partly reproduced in the gable of the dairy-house and in the ivied 'Pynion end.' I think from the considerable rebuilding of the top of the north wall of the western barn,—that now in use,—that there was a time when it could not and did not therefore carry a roof. Probably this was after the spoliation of the monastery at the Dissolution, for I put down the present roof, with its quasi-hammer beam, but not very old-looking framing, to be of the seventeenth century only, and probably always thatched as now. Whereas I cannot but believe that such grand walls originally carried a noble massive roof, with most likely stone tiles,—such a roof as that at the majestic Cerne Abbas barn. Further, I venture to think that the barn was parapeted all round, the parapet carried on corbels and with rain-holes in the parapet. The south wall shows signs of this. Before quitting the barn, I may say that while I think the roof only 200 or 300 years old, the beams upholding the upper floor in the north porch may be original, and just possibly the two or three vastly long ones reaching right across the barn. The north doors are by no means new, perhaps as old as the roof. On the oak door-bar there is a cutting of the date 1730. I cannot see how wagons got easy exit or entrance at the south doors, the steep land rises so close to them. I think, indeed, the disused mill-race there to be a modern intrusion, but even allowing for this there seems but little room. As no remark seems called for respecting the all but demolished gatehouse, the supposed scene of the starving to death of the last abbot, we now pass on to by many degrees the most noteworthy building belonging to Abbotsbury Abbey. This, of course, is St. Catharine's Chapel, intended, it is believed, both as a seamark and beacon tower, and as a chantry for sailors. Chapels with this dedication to St. Catharine are often on hills,—for instance, the little one at Milton Abbas. Why was this? Mr. Hills, secretary of the British Archæological Association, when they met here in 1871, threw out this suggestion. Catharine is from καθαρος pure, as every one knows. Might the high situation for her chapels be chosen with an idea of placing them in air of congenial purity? Again, another idea is that lofty sites were chosen because of a mountain coming into the legend of St. Catharine's death, when she was borne of angels to Mount Sinai. But, for whatever reason so placed, here we have a grandly situated St. Catharine's, and well worthy of its heavenward, airy site. From appearance, and I think from tradition, the track to the chapel from the monastery seems to have taken a reach through or more likely north of the abbey garden, and then a contrary reach south-west, skirting the north ends of the many landchets which so remarkably cover the east side of the hill. Now, as to the building. Set up there, buffeted by all the blasts of heaven, specially by the unbroken force of the tearing south-westers, no common building could stand for long. And it is no common building that was placed there in the first half of the fifteenth century, and stands bravely up, roof and all, now in the evening of the nineteenth. Yes, there is the roof—that is the wonder. Fergusson is severe on the imperfections of most roofs, ancient, Mediæval, and modern. They mostly consist partly of wood. A glorious vaulted church, like Westminster, let alone as St. Catharine's was for ages, would shortly fall to pieces. The outer lead and wood roof is perishable, and would not long keep off rains, and worse still, frosts from the thin film of stone forming the groined inner roof. This would then perish lamentably. Not so with what he calls a genuine roof,—a really imperishable one, stone without, stone within, stone all through. Such are rare in these islands; and rarest of all, I fear, in England. I myself have seen only four: two in Scotland,—Roslyn and Borthwick; two in England,—our Dorset St. Aldhelm's and our Dorset St. Catherine's here. How splendidly this last is planned for its situation. How splendidly was the plan carried out. Go within, and how splendidly there, too, has solid simplicity been glorified with admirable detail in that roof. I may be wrong, but I think that this style of detail for a roof,—bold vaulting ribs richly bossed where ridge and purline ribs intersect them, and each recess so formed simply panelled like three blank foliated window lights,—I think this style a very rare one. All the rest of the chapel harmonises perfectly with the imperishable looking yet not cumbrous roof. The parapet surrounding it, with the bold spots of shadow formed by the rain-holes, the beacon turret, the massive buttresses crowned with crenellated cresting instead of pinnacles, the porches so enduring looking,—all are in absolute concord and combine into as perfect a Mediæval building of its kind and for its purpose as can easily be found anywhere. I have only to add, firstly, that while everything else inside and outside stamps St. Catharine's as of the fifteenth century, the piscina rather looks as if of the fourteenth; and, secondly, that the projection of some of the upper courses of the turret is to me a puzzle. It does not appear to show inside. It obviously is not an accident, and yet there seems no reason or use for it. I am ashamed of this tame sketch of St. Catharine's. Every Dorset man with the least glow of admiration for our old-world betters in design and in work, — every such Dorset man must have a real affection for this our old country's triumph of headcraft and handicraft. But I am here to read a paper, not to make an oration, if I could even. And while expressing shame, let me apologise for my string of conjectures throughout this paper. I might be a very Yankee for guessing. But let me end at least with a certainty. There certainly was an amazing plenty of energy, art, and money in Abbotsbury Abbey in the fourteenth and fifteenth centuries. All we see dates from that epoch. Nay, St. Catherine's, the barn, the pynion end, and the dairy-house gable are all identical in style, and must have been built within a very few years of each other. At what a vast cost! But we know that the Benedictines did, as the ages went on, heap up riches. Some contrast between Benedict, unseen, lost to the knowledge of men, hidden in a drear cave in the wild waste of Subiaco that he might be alone with God, and his Benedictines 800 years after pulling down their barns here to build greater with their redundant money for their unmeasured corn. Well for them, though, if the annals of Benedictine St. Alban's, for instance, told of the Order no worse things than that here, in this fair Dorset vale, the Abbotsbury Benedictine fathers reared up stately, seemly building after building of the mellow ochry ashlar, to glow in the evening suns of half a millennium."

THE SANITARY CONGRESS AT YORK.

THE following will be the order of the proceedings in connexion with the Ninth Autumn Congress of the Sanitary Institute of Great Britain, to be held in York next week:—

Tuesday, September 21st.

1 p.m.—Reception by the Right Hon. The Lord Mayor.—Exhibition Buildings.
1·30 p.m.—Public Luncheon.
3 p.m.—Opening of Exhibition by the Right Hon. The Lord Mayor of York.*
8 p.m.—First General Meeting.—Opening Address by Sir T. Spencer Wells, Bart.

Wednesday, September 22nd.

Section I.—"Sanitary Science and Preventive Medicine."
10·30 a.m.—Address by Prof. F. S. B. F. de Chaumont, M.D., F.R.S.
11 a.m. to 1 p.m.—Papers and Discussions.
2 to 5 p.m.—Conference of Medical Officers of Health.
8 p.m.—*Conversazione*, in the Exhibition Building.

Thursday, September 23rd.

Section II.—"Engineering and Architecture."
10·30 a.m.—Address by Mr. Baldwin Latham, M.Inst.C.E., F.R. Met. Soc.
11 a.m. to 1 p.m.—Papers and Discussions.
2 to 5 p.m.—Ditto.
8 p.m.—Lecture to the Congress by Capt. Douglas Galton, R.E., F.R.S.

Friday, September 24th.

Section III.—"Chemistry, Meteorology, and Geology."
10·30 a.m.—Address by Mr. William Whitaker, B.A., F.G.S.
11 a.m. to 1 p.m.—Papers and Discussions.
2 to 4 p.m.—Ditto.
5 p.m.—Closing General Meeting of Congress.

Saturday, September 25th.

Excursions.
8 p.m.—Addresses to the Working Classes by Mr. G. Vivian Poore, M.D., F.R.C.P.; Mr. Edward C. Robins, F.S.A., F.R.I.B.A.; and Mr. James Mansergh, M. Inst. C.E.

* The Exhibition will remain open until Saturday evening, October 16th.

THE WATER SUPPLY OF BIRMINGHAM.

MR. C. E. MATHEWS, F.R.G.S., read a paper before the Mechanical Science Section of the British Association last week, on "The Birmingham Water Supply, from the Year 1826 to the Present Time." He commenced by saying that in the year 1808 the population of Birmingham was slightly in excess of 70,000 souls. There was then no regular water supply. The 12,000 houses which then constituted the town were either supplied by pumps from ordinary wells, or were dependent upon water-carts for their daily consumption. The system in vogue in the days of their grandfathers seemed sufficiently satisfactory, and no one desired any change. Mr. Ralph Dodd, however, a London engineer, with unerring professional instinct, spied out the nakedness of the land, and published a report on the "Intended Birmingham Waterworks," addressed to the inhabitants in general, and to the subscribers in particular, in which he showed that an ample supply of water could be procured at a very reasonable cost, and that subscribers to his intended undertaking would reap the double advantage of conferring a benefit upon the public and of putting money into their own pockets. A committee appointed by a town's meeting to consider the scheme resolved, "That the erection of waterworks in this town was wholly unnecessary, and would be productive of great evil." Nothing further was heard of Mr. Dodd. Similar proposals were made by other persons, and also proved abortive, and it was not until the year 1826 that the Birmingham Waterworks Company obtained an Act "for supplying with water the town and neighbourhood of Birmingham." The promoters of the scheme were influential men, and nearly eighty of the leading inhabitants,—including such well-known names as Attwood, Spooner, Anderton, Lloyd, and Scholefield,—were duly incorporated by the name of "The Company of Proprietors of the Birmingham Waterworks." The estimate for the undertaking was 116,925*l.* The capital was fixed at 120,000*l.*, in shares of 25*l.* each, with borrowing powers not exceeding 30,000*l.* more. The works authorised were a reservoir at Aston, near Salford Bridge, and another at Edgbaston. Mr. Mathews, after describing the early operations of the new company, went on to say that in 1851 the Birmingham Improvement Act was passed, which contained a clause empowering the Corporation to supply water to the borough and to purchase the works of the company, at a price to be fixed by arbitration or by a jury. In 1854 notice was given by the Corporation of their intention to purchase the undertaking of the company. Subsequently the company obtained power to increase its capital from 120,000*l.* to 240,000*l.*, and to borrow 30,000*l.* in addition to the sum authorised to be borrowed by the Act of 1826. In March, 1864, public attention was attracted to the water reservoirs, by the bursting of the dam of the Bradfield reservoir, near Sheffield. In the same year the directors consulted Mr. Hawkesley; and in a report, dated September 19, 1864, that eminent engineer propounded his views as to future sources of supply. He investigated the Tame, the Rea, the Cole, the Blythe, the Park Brook, and the Arrow, the Avon, and the Severn, and also called particular attention to the water-bearing strata of the new red sandstone formation. He desired to add Sutton Coldfield, Curdworth, Coleshill, King's Norton, Northfield, and Harborne, to the districts of Birmingham and Aston as the future area to be supplied. He dismissed other rivers in the neighbourhood as either already contaminated or likely to become so, and he pointed out that in the immediate vicinity of Birmingham there were many square miles of the Lower Keuper and Upper and Lower Bünter sandstones, which he believed were replete with water of a very fine quality. He therefore recommended the sinking of wells at Aston, Edgbaston, Sutton Coldfield, and Upper Witton, from which he anticipated a yield of eight million gallons per day. It was remarkable that the waters of the Bourne, near Whitacre, which now formed a considerable portion of the daily supply, were not included in this memorable report. The company from time to time enlarged their area as well as their capabilities for supplying water. In 1875 the directors not only paid eight per cent. to their shareholders, but applied between 2,000*l.* and 3,000*l.* in working up dividends for the half-year ending June 30th, 1865. Mr. Mathews

referred at some length to the great fight between the Company and the Corporation concerning the compulsory purchase of the undertaking, which was transferred on August 2nd, 1875. The undertaking was to be transferred to the Corporation by a deed containing six lines, and each shareholder was to receive payment by way of perpetual annuity. The annuities were charged on the revenues of the undertaking, aided, if necessary, by the rates. After five years a sinking fund was to be established, by which all the annuities were to be extinguished within ninety-five years from the passing of the Act. A reserve fund was also to be provided, limited to 50,000*l*. The surplus, if any, of revenue after making these provisions, and the annual proceeds of the reserve of 50,000*l*., were to go to the Borough Fund. The shareholders received, in addition to their capital, nearly 700,000*l*. by way of goodwill. The concern was taken over by the company on the 1st of January, 1876, and Alderman Avery was elected chairman of the Water Committee. The work initiated by the company was carried on by the Corporation, and the profit at the end of the first year, after the payment of the annuities and all out-goings, amounted to 5,456*l*. A considerable reduction in the water rentals was made in 1881, and a still further and greater reduction in 1883, with the result that for the first time for forty years there was a deficit. The reduction was applied in respect chiefly of small house property, but all classes of consumers reaped some advantage. The reductions made by the Corporation had amounted altogether to 26,175*l*. per annum; in other words, if the old tariff had remained in force the rental of 1885, instead of being 115,704*l*., would have reached a total of 141,879*l*. In 1878 it was found that the daily average quantity of water required for consumption, which had previously been 7·7 million gallons had risen to 8·76 million gallons. It was estimated that in four years more the average daily requirement would be 10½ million gallons, with a maximum of 14 million gallons. The provision made for meeting the increased demand for water was described, and in 1881, Mr. Mathews said, the advantage reaped by the ratepayers, both as water consumers and as ratepayers, was equal to a rate of 2½d. in the pound. In 1883 the fourth and last area of supply was added. In 1875 the population in the area of the water supply was 400,000. In 1885 it was 600,000 in the extended area, and of this population about 500,000 used the Corporation water. In 1875, the annual consumption was 3,090,000,000 gallons; in 1885, 4,300,000,000 gallons, the present supply to meet this increasing demand was as follows: — Aston Well yielded 3 million gallons per day; Witton Well 2½ millions; King's Vale Well, ¼ million; Perry Well, 2 millions; and Selly Oak Well, 1¼ million gallons per day; or a total of 9 million gallons of well-water per day. In addition, Plant's Brook yielded two million gallons per day; Perry and Witton streams, one million; Blythe, 2½ millions; Bourne, two millions; making the total river-water, 7½ million gallons per day. There was, therefore, a supply of 16½ million gallons to meet a demand of, say, 12 million gallons, and this altogether exclusive of storage. In 1875 the storage was 175,874,832 gallons. In 1885, 441,817,081 gallons. In the event of a serious and protracted drought, the population included in this great area, containing 81,591 acres, had a provision of 26½ million gallons for sixty days, or 21¼ million gallons for 130 days. They need have no anxiety, therefore, for the future, though, as all the pure streams within the legitimate water-shed had been already annexed, it was obvious that further extensions could be made only in the direction of increased storage and more deep wells. The loss shown by the balance-sheets for the three years ending the 31st of December, 1885, did not give the department any uneasiness. Indeed, the loss was more apparent than real, as interest on the reserve fund of 2,000*l*. per annum, and the sinking fund for the repayment of the annuities had first been deducted. The Water Committee believed that in three years the present adverse balance would be cleared off, and that they might before long be able to consider the question of further reductions in the water rental.

The President of the Section (Sir J. Douglass) said they had to congratulate the directors of the first company and the Corporation of Birmingham on the great success that had attended their efforts to give to the town a liberal supply of good water at a low cost.

Alderman Avery said the paper to which they had listened would be of considerable value as a permanent record of the history, the progress, and rise of the Birmingham water undertaking. No part of the paper gave him more satisfaction than the manner in which the old company was recognised throughout. In their day and generation they did their work wisely and well, and they were continually advised by one of the most eminent of engineers, Thomas Hawksley. Though a trading company, they recognised with honourable fidelity their obligations to the public. As Mr. Mathews stated in his paper, they enjoyed the unspeakable felicity of doing a good service to the public and filling their own pockets at the same time. In this advanced age of civilisation, it was hardly worth while discussing the question whether or not the matter of the water supply, involving the health and lives of the whole community, should be in the hands of private companies, who were necessarily governed by public obligations and also by financial considerations, or whether it should be in the hands of the Corporation. The Corporation had just the same views, but in a different degree. Instead of making the financial results predominate, they were subordinated to the sanitary results. The Corporation of Birmingham had expended, since January, 1876, no less a sum than 446,000*l*. in constructing and converting reservoirs, and in providing hydrants, in enlarging the mileage of the distribution mains, and in other useful work. They had also provided for the interest and repayment of that vast sum of money, and they had besides, in a financial sense, earned sufficient to reduce the price to ratepayers to the extent of 26,000*l*. yearly, or equal to a rate of 4d. in the pound. So that though they paid a very good price,—much more, he thought, than they ought to have paid,—they had no reason to be disappointed with the result. They stood at the present time, having paid the annuities and made provision for outlay, with a net surplus fund in hand of about 39,000*l*.

The Mayor (Alderman Martineau) remarked that the more they saw of the working of the water-supply in Birmingham the more reason they had to be satisfied with all the early provisions that were made by the directors of the company.

Sir Thomas Hawksley, referring to his connexion with the waterworks companies in Birmingham and elsewhere, said it was in 1831 that the Nottingham company entered on the principle of a constant supply. Birmingham followed the example, and ultimately the principle was adopted all over England, with the exception of the metropolis. Birmingham started well, and continued in the path on which it started. The cost of obtaining water was increasing every year; for they were obliged to go further and further afield. In some places it was almost impossible to obtain a proper supply. Most of the valleys were becoming occupied by railways, and besides there was a spread of the population.

Mr. C. E. Mathews, in reply to a question, said the Corporation pumped their water to an altitude of about 500 ft.

EXPERIMENTS IN ELECTRIC INDUCTION.

IN the Section of Mathematical and Physical Science, British Association Meeting, Birmingham, Mr. W. H. Preece, F.R.S., gave an interesting account of some experiments in electric induction between wire and wire. He prefaced his remarks by stating that along the Gray's Inn-road, London, the Post Office had a line of iron pipes buried underground, carrying many telegraph wires. The United Telephone Company had a line of open wires along the same route over the house-tops, situated 80 ft. from the underground wires. Considerable disturbances were experienced on the telephone circuits, and even worse, signals were read which were said to be caused by the continuous and parallel telegraph circuits. A very careful series of experiments extending over some period proved unmistakably that it was so, and that the well-known pattering disturbances due to induction were experienced at a much greater distance than was anticipated. With a view of finding out how far these effects could be detected, experiments were conducted on the Newcastle Town Moor. The area of the disturbance was extended to a distance of 3,000 ft., while the effects were detected on parallel lines of telegraph between Durham and Darlington at a distance of ten miles and a quarter. But the greatest distance experimented upon was between the east and west coasts of the Border, where two lines of wire forty miles apart were affected, the one by the other; sounds produced at Newcastle on the Jedburgh line being distinctly heard at Gretna, on a parallel line, though no wires connected the two places. The experiments were made on a Sunday, and in order that there should be no possible mistake between the sounds obtained by working the telegraph, a special commutator was placed at the Newcastle end. By several rapid intermittent currents a sound resembling a rising and falling wail was produced, which was heard distinctly at Gretna. Every possible precaution was taken by isolating the lines, but they were still compelled to use the earth. It should also be remembered that the whole of the North of England was one network of telegraph wires. Although the experiment was very interesting, he did not think it conclusively proved that inductive effect could be transmitted across such a length of country. At the same time the evidence was quite sufficient to justify a pursuit of their researches in this direction as far as they possibly could. At the present moment they were putting up from London to the Welsh coast a line of copper wire, many lengths of which, extending forty and fifty miles, would be perfectly distinct from any other system in the country. In the next two months, during the construction of the line, he hoped to be able to make many more exhaustive experiments. Careful experiments had also been made to show that the effects were quite independent of the earth, and were probably inductive effects through the air. In one case a circuit of copper wire, sheathed with gutta-percha, was laid on the ground forming a quarter of a mile square. At a distance of a quarter of a mile another square of similar dimensions was formed. It was then found possible to hold distinct conversation by telephone through the air without any connecting wire between the two squares. This distance, it was thought, could probably be much exceeded. It was not even necessary that air should be the medium between the two wires. Since those experiments were made the English cable to the Scilly Islands was broken at a certain part. Half a mile from the damaged cable there was another belonging to one of the submarine companies, and extending to Brest. These two cables were half a mile apart in the water, and they did not approach each other on shore, yet signals on the Scilly cable were heard distinctly on the French one. Mr. Edison, as they knew, had been working in this direction in America, and had been able to establish communication with passing trains. The trains carried induction coils, which sent their influence to induction wires along the line and enabled conversations to be carried on. There was no doubt that this inductive influence would lead to inquiries and result in a more extensive and practical development of the telephone.

Professor Thompson said he must enter a mild protest against the somewhat miscellaneous use of the word induction. In the experiments from square to square he did not doubt that the results were produced by genuine induction, but in the other experiments, notably the forty-miles one, he believed the greater portion of the effect was due to the earth returns.

FURTHER NOTES OF THE TRADES' UNION CONGRESS.*

Factory and Workshop Inspection.

WITH regard to Factory and Workshop Inspection, Mr. T. Birtwistle (Accrington), moved

"That, in the opinion of this Congress, the Factory and Workshops Act is destined to become a dead letter, unless a much closer supervision is inaugurated, and for this purpose a considerable increase in the staff of factory and workshop inspectors is indispensable. This Congress, therefore, instructs the next Parliamentary Committee to continue to urge upon the Government the importance of appointing a considerable additional number of practical working-men, and, where expedient, women, as factory and workshop inspectors."

In proposing that resolution, he said that what was wanted, in his opinion, was a more

* See p. 398, *ante*.

thorough supervision all over the country. They proposed that the 55th Section of the Act should be made to apply to workshops as well as to factories.

Mr. Freak (London), in seconding the proposition, said he supposed that none but those who lived in London saw the evil of the want of official inspection of a certain class,—not of factories, but of workshops, which were springing up all over the Metropolis. In London there was a great deal of outdoor employment in workshops, and they wanted the same interference for them as they had within the factories. Employers were managing to do away with the possibility of having an adequate arrangement for inspection in factories, by giving their work out of doors very extensively. In the shoe trade and tailoring trade there was no great deal of space required for each individual to do his work, and the consequence was that the workers were packed together like sardines in a box, with scarcely room to move. No one could get inside the dens where the unfortunate people worked to see what they were like. He thought that something should be done to root up those places. He thought that a proper workshop and factory inspection by officers who knew where these places were was absolutely necessary, as the system under which the people he had referred to had to work was intolerable.

Mr. Howlett (Hull) moved, as an amendment:—"That the number of sanitary inspectors be greatly increased, but that no man be appointed to the post of sanitary inspector of workshop or factory without passing a thoroughly practical examination."—On the recommendation of the Chairman, he consented to allow this to go as a resolution to the Standing Orders Committee.

Mr. Slatter (Manchester) asked how they could best increase the numbers of inspectors. The difficulty was a financial one. Because a parsimonious feeling prevailed, the Acts were inefficiently carried out. What he thought they ought to do was to impress upon the Government that they were determined, while they believed those Acts to be good and necessary for the health and welfare of the people, that there should be no difficulty in finding the money to see the proper number of inspectors appointed. He believed that there were other departments in their national administration where economy might be far more effectually practised than in a parsimonious administration of those Acts.

The motion was, after some further discussion, carried unanimously.

Engineers' Certificates.

Mr. J. T. Swift moved the following resolution:—

"That, in the opinion of this Congress, most of the loss of life and injury to person caused by boiler explosions and accidents to machinery is caused by the want of practical experience in the persons placed in charge of steam-engines, boilers, and machinery; that, therefore, some Government test of practical fitness should be provided by Parliament, and that the Parliamentary Committee be instructed to arrange for the introduction of a Bill which will secure this desirable object."

He stated that from 1864 to 1885 the returns of one Boiler Insurance Company showed that 1,017 explosions had taken place, that 1,146 deaths had occurred, and that 1,926 people had been injured. Last year there had been fifty-four explosions, forty-five deaths, and eighty-three persons injured, though the whole of those explosions had not consisted of the bursting of boilers. In looking through the figures he found that out of 33,000 examinations only 752 serious defects had been pointed out, whilst 2,586 minor deficiencies brought up the total to 3,338 out of 33,000 inspections.

Mr. W. H. Lambton (Durham) seconded the resolution, which was carried unanimously after an explanation by the mover that it was not intended to make the Act retrospective. Men who had been in charge of an engine for two years before the passing of the Act would receive a certificate of competence.

Evidence in Coroners' Courts.

Mr. B. Pickard, M.P., moved:—

"That, in the opinion of this Congress, relatives of deceased persons or their representatives, or any person appointed by workmen of any workshop or mine, shall be allowed by law to attend coroners' courts for the purpose of questioning witnesses or giving evidence to the Court, in order that the cause of death may be fully inquired into; it therefore urges upon the Parliamentary Committee the necessity of securing further legislation on this important matter."

This was seconded and carried unanimously.

Overtime.

Mr. Broadhurst, M.P., proposed:—

"That, in the opinion of this Congress, the systematic working of overtime in many of the trades of the country is an evil to the persons so engaged and an injustice to the large body of unemployed, and should, therefore, be discontinued. Also that the system of piece-work, except in such trades where standard prices can be classified and maintained, is an injury to the moral, physical, and social well-being of the working people."

Mr. Broadhurst said he moved the resolution as the representative of the Operative Stonemasons' Society, and it was the first resolution his trade had ever asked him to move in the fifteen years he had represented them in that Congress. The resolution was in favour of doing away with the system of overtime, which had of late years considerably increased amongst the trades. The second part of the resolution was directed against the evil system of piecework where it was adopted in trades that could not well ascertain a standard price, and where it was not easy to maintain the varying values of the work done. For instance, in the tailoring trade it was easy to ascertain and maintain the value of a garment, a pair of boots, and of many other articles of necessity. But with masonry, where every piece varied from another piece, and in joinery, where much the same difficulty prevailed, they had found that the system of piecework had been used to the great disadvantage of those who engaged in it. Thus, if he obtained a price that week of so much per foot, and he made ten shillings more than his wages, the probability would be that next week, through his extra labour, his employers would insist upon a still further reduction in the price, so that they could go on and on till nothing but ruinous prices were allowed for the work done. That was well known to joiners who had worked in London twenty years back. A great firm there had done it to such an extent that they not only ruined others, but he was very happy to say they had succeeded in ruining themselves. They were all complaining of the large number of men out of employment in their trades. Many of the trades had a considerable amount of remedy in their own hands, if they only cared to exercise their powers. He knew in his own trade that within five minutes' walk from the house in which he lived, there was a building in course of erection where all the building operatives were employed during the whole of the daylight each day, while there were a great number of men in the same trades walking about without anything to do. They said that the work should be equalised as far as possible. They contended that overtime was an evil to the men engaged in it, physically as well as morally. Overtime money had never done much good to those receiving it. It demoralised all concerned in it, and it was an enormous injustice to those who were out of employment suffering from that evil. He understood from a gentleman in the Congress that he was likely to move an amendment to the effect that forty-eight hours per week should be the week's work. They all agreed that forty-eight hours per week would be a desirable limit to fix for labour, but when they had sixty-six and seventy hours a week it would be much more practical for those out of employment that they should succeed in reducing the limit to fifty-six hours per week than that they should neglect the present and practical evil for the purpose of endeavouring to apply hours to a universal system which, however desirable, would take a very long time to establish throughout the length and breadth of the country.

Mr. J. Swift (Manchester) seconded the resolution, remarking that the question of overtime was day by day coming to the front. In America it had been decided that all overtime should be paid for at the rate of time and a half, and it was high time that the systematic practice of men being kept out of employment by reason of others working overtime at the ordinary rate should be put an end to.

Mr. J. M. Jack (Glasgow) moved, as an amendment, the insertion of the words, "wherever the unions have sufficient influence for the purpose," urging the abolition altogether of the present system of overtime.

Mr. J. O'Neil (Hull) seconded the amendment, emphatically declaring his conviction that the system of overtime was an evil which they should do their best to remedy.

Mr. Freak (London) supported the resolution, on the ground that if the words proposed by Mr. Jack were inserted, they would weaken the effect of the resolution, especially in regard to the working hours in Government works.

Mr. Arrandale (Manchester) supported the resolution, contending that the piecework system ought to be done away with.

Mr. Knight (Newcastle) supported the resolution, and said there were times when men were compelled to work overtime, but the Unions ought to put a stop to systematic overtime. They could not abolish piecework, but they could have a standard rate of payment for such work. The foremen and managers were the greatest tyrants, as they asked men who were out of work to send in contracts for piecework.

Mr. Hughes (Liverpool) suggested the alteration of the wording of the resolution so as to read, "Also that the system of piecework, which has got deeply rooted in many trades of the country, is an injury to the moral, physical, and social well-being of the working people," but Mr. Broadhurst declined to accept this amendment.

After some further discussion, a vote was taken, when eighteen delegates voted for the amendment, and fifty-four against it. The amendment was declared lost.

Mr. Threlfall (Southport) then moved "the previous question," which was seconded by Mr. Inskip and carried by fifty-five to twenty-three, thus for the time shelving the decision of the Congress on this important question. The subject came up again, however, on the last day of the Congress, when Mr. Swift formally moved:—

"That, in the opinion of this Congress, the systematic working of overtime in many of the trades of the country is an evil to the persons so employed, as well as an injustice to the large body of unemployed, and should, therefore, be discontinued."

Mr. Threlfall (Southport) seconded the resolution.

Mr. Drummond (Glasgow) suggested, as an amendment, that all overtime should be charged either time and a half or double time, but, after some further discussion, the resolution was unanimously carried.

Registration of Plumbers.

Mr. J. Howlett (Hull) proposed:—

"That, in the opinion of this Congress, it is essential, in the interest of the public health, that the plumbers should be properly qualified by being registered, and that such registration be made compulsory."

Mr. Howlett pointed out that they, as plumbers, were convinced that unless the present system of optional registration was converted to a compulsory system no satisfactory results could be attained. What they wanted was that the already qualified plumbers should be properly registered, the instruction of the rising generation in a proper system of plumbing, and an organised inspection of all plumbers' work.

Mr. S. Uttley (Sheffield) seconded the proposition, observing that the object of the Congress was, he took it, to obtain the best possible workmen in all trades, whilst at the same time they took care to do everything in their power to improve all sanitary matters.

Mr. W. Pickard, J.P. (Wigan), supported the resolution, and urged upon the Congress the necessity of a general improvement in the sanitary laws of the country. The law in this respect needed quite as much attention with regard to the mansion as it did to the cottage, and no more important question could have been brought before the Congress.

The resolution was then put to the vote, and carried unanimously.

Sanitary Inspectors.

Mr. J. Howlett (Hull) moved, and Mr. Biggins seconded:—

"That, in the opinion of this Congress, it is desirable that the nnmber of sanitary inspectors be largely increased; but that no man be appointed without previously passing a thoroughly practical examination."

Mr. McIntyre (Glasgow) moved the previous question. Mr. Stradley (London) seconded, but on being put to the vote the original motion was carried.

Mr. Broadhurst, M.P., was unanimously elected Parliamentary Secretary, and the Parliamentary Committee was appointed.

The Congress again practically negatived a proposal in favour of opening museums on Sunday.

It was resolved to hold next year's Congress at Swansea.

One of the results which have followed the holding of the Congress in Hull was a meeting of bricklayers at the Corporation Hotel, Neptune-street, on the 11th inst., with a view to forming a branch of the Operative Bricklayers' Society in the town. Mr. J. Toomey, the society's delegate to the Congress, attended, and explained the benefits and advantages appertaining to the society. The society, he said, had paid to members and their families since June, 1869, for sickness, 35,674*l.*; for funerals, 9,589*l.*; for accidents, 634*l.*; for superannuation, 296*l.*; for trade privileges, 4,757*l.*; grants to other trades, 853*l.*; making a total expended of 51,805*l.*; and upon December 31st, 1885, the worth of the society was 30,826*l.* At the close of his remarks, several men gave in their names.

THE WALLS OF CHESTER.

SIR,—Referring to the letter on this subject, signed "F. S. A.," which appeared in your issue of last week [p. 375], it is not denied that the members of the British Archæological Association had pointed out to them in 1849, both at the Northgate and Roodeye, walls composed more or less, to all appearance, judging from their faces, of Roman stones, as, in fact, they still exist. Further, under the circumstances, those archæologists, following Mr. Roach Smith's view, could come to no other conclusion than that the walls themselves were Roman. *Mais nous avons changé tout cela.* Excavations have shown that at the Northgate only some of the facing stones were of Roman date, that they had no Roman mortar, and that a slight and very rotten wall was behind them, with poor and late mortar much decayed. Again, at the Roodeye, where some large stones project from the wall, many of which seem to bear marks of Roman tooling, and have been found to extend 15 ft. beneath the surface, excavations have shown that they have been merely placed in front of a clay bank, to prevent it from slipping forward, and thus destroying the wall proper, which latter is on the said bank above, and behind the large stones.

As to the nature of the stones of which the walls are composed, competent geologists have found them to be composed of the same stone as the rock on which Chester is built, and they have not been brought from a distance. It has also been found that both the red and white lichen grow on the same Chester red sandstone, so that the presence of a red lichen on one part of the walls, and of a white lichen on another, is no evidence that the stone in each is different. That, in places, buried deep below the present walls, some portion of original Roman work may exist, is quite possible, and I think will be found to be the case, but above ground nothing of the Roman age remains *in situ*, as was verified by the decision of the numerous archæologists and architects who accompanied the members of the Royal Archæological Institute at their recent meeting in the City.

W. THOMPSON WATKIN.

Liverpool, September 14.

Thrashing Corn by the Transmission of Electrical Power.—A further application of electrical power has just been made on the estate of the Marquis of Salisbury at Hatfield by Mr. Shillito, the resident electrician, in addition to those which we have recently recorded, but in this case Gramme machines have been used, the generator being driven as before by water-power, half a mile distant. The Gramme machine is connected in the ordinary way to one of Clayton & Shuttleworth's thrashing-machines. The result is reported to be highly successful in every respect, a very regular, rapid, and noiseless power being obtained. In contrast with the ordinary steam engine, with its demand for skilled attention, and for constant supplies of water and fuel, the new motive power is most promising, and no doubt a great saving in cost can ultimately be effected, wherever the circumstances for the supply of power are favourable. Should a temporary stoppage of the machine be necessary, an ingenious arrangement has been made by Mr. Shillito, whereby the current from the leads can be turned from the Gramme machine into a cluster of Swan's lamps, so that a short break in the operations does not necessitate any communication with the source of power, or stoppage of its regular working, and at the same time gives warning to the men where the current is running.

The Student's Column.

STONE QUARRIES.—XII.

ABERDEENSHIRE GRANITES (*continued*).

THE mineral constitution of the granites of this county varies greatly. Speaking broadly, it consists of a mixture of quartz, felspar, and mica; frequently with the addition of some hornblende. This last mineral, however, is almost without exception in very minute quantities, and may thus be regarded as merely accessory; but true hornblendic granite is not unknown in the county. Occasionally, the mica occurs in very small quantities; sometimes it is nearly or altogether absent; and many considerable masses of rock occur,—known as granite,—composed principally of quartz and felspar, with very little of anything else.

The difference in colour is owing primarily to the nature of the felspar, this mineral varying in tint from red to white. The redness is, no doubt, owing to a mixture of peroxide of iron, disseminated throughout the mineral.

Besides the Peterhead district, red granite is very common in many of the mountains in the interior of the county, more especially near Braemar. The celebrated mountain known as Lochnagar, not far from Her Majesty's Highland residence at Balmoral, is wholly composed of granite, much of which is of a reddish colour. Ben-Muick-Dhui, Ben Avon, and Cairngorm, which are amongst the highest hills in Scotland, are likewise all formed of granite.

With such an abundance of material in the county, and much of it being near the sea, it is not wonderful that, after engineers and others gave an impetus to the quarrying of it, granite work became one of the most important industries, not only of the county, but of Scotland. We learn that even in 1817, the quantity of stone exported from Aberdeen to London was 22,167 tons; in 1821, the total export was 34,687 tons; and in 1868, about 50,000 tons. The amount fluctuated considerably in different years of the above periods. In 1860, for example, it only reached 24,666 tons. This, of course, represents nothing like the total amount raised from the quarries during the respective years; and it is calculated that over a million tons are now quarried in Aberdeenshire every year.

We are informed that the trade with America was once much more considerable than it now is, which is largely owing to the opening up of quarries in Rhode Island and elsewhere. Many of these, however, are in the hands of well-known Scotch granite merchants.

Although the introduction of the present system of polished granite into architectural ornamentation, monumental sculpture, &c., is of comparatively recent date, granite polishing was known more than one hundred years ago among the jewellers of Aberdeen, as the following extract from the *Aberdeen Journal* of the 3rd December, 1770, shows:—

"Colin Allan, jeweller and goldsmith in Aberdeen, begs to acquaint the public in general that he has established a manufactory for sawing and polishing granite slabs, tables, and chimney pieces, &c."

We will now describe some of the principal quarries that have come under our notice.

1.—*The Aberdeen District.*

Rubislaw Quarries.—These are situated about two miles from the centre of Aberdeen, and have been worked for a great number of years. The granite is of a greyish-blue colour, and very fine-grained. The three minerals are equally mixed, quartz being transparent white; felspar, white, and generally minute, but occasionally crystals up to 7 mm. in diameter are seen; the mica is black.

The rock lies in irregular masses, with numerous seams in all directions, and the blocks are usually found standing on the flat. One portion of the quarries has been worked in benches of from 50 ft. to 70 ft. in depth, and the present section of rock shown will last a number of years, even at the present rate of output, without compelling the owners to sink any deeper. Every time the quarry has been deepened, the colour of the stone has assumed a slightly richer greyish-blue colour, which renders it valuable for monumental and polished work, for which purposes it is very largely used. The blocks are roughly dressed and squared with hammers, and those intended to be polished are sent to the various granite works in Aberdeen, whence it is not only carried to various parts of the United Kingdom, but to America, Australia, and to the East generally.

Most of the paving-stones made come into the London market, and the rest of the produce of the quarries is used for ordinary building purposes.

From 1795 to 1820–30 this stone was supplied in large blocks for dressed work, and used in the construction of Portsmouth and Sheerness Dockyards, Bell Rock Lighthouse, balustrade of Waterloo Bridge, London Bridge, &c.

Dancing Cairns Quarries.—These are very old, and situated about two miles and a half from Aberdeen. The stone is of a bright light blue or grey colour, and is composed of clear quartz, two felspars (orthoclase and oligoclase), and black mica.

The "posts" of granite,—the masses of granite that stand separate from each other by dries or natural divisions,—as a rule, are irregular, and not very large, although occasionally, as the quarry is worked into, several large blocks are found together, when they are usually sent to Aberdeen to be polished. The quarries are largely worked for paving-setts, and many thousands of tons of rubble for building purposes are annually carted into Aberdeen. From the indiscriminate manner in which stones from different quarries are built into the walls of some of the buildings in that city, it is not easy to discover which buildings are wholly made of Dancing Cairns stone, but we might mention two good examples of it, one in the portico of the Music-hall Buildings, and the other, the monolith of the statue of the Duke of Gordon, which weighed over 14 tons.

Sclattie Quarry.—This is about a mile further from Aberdeen than the last-mentioned quarries. The stone is fine-grained, not unlike the Rubislaw, except that it is a little lighter in colour, owing, perhaps, to mica not being quite so abundant. It has a decided and tolerably regular grain, being used largely by masons, though it is not very extensively polished. The beds of rock are heavier and more upright in this quarry than in Dancing Cairns, and the stone is suitable for dock and general engineering purposes.

To use up the smaller stones and the cuttings from the larger ones, a number of "causeymen" and curb masons are employed. This quarry also supplies large quantities of building rubble, facings, &c.

Dyce Quarry.—This is situated about eight miles from Aberdeen and about two miles from Dyce Railway Station on the Great North of Scotland Railway. The rock is of a greyish-blue colour and fine-grained. When polished on planes not coincident with the planes of a rough kind of foliation which is exhibited, the stone has a peculiar striped appearance. This, of course, is of much assistance to the mason in chiselling it, and makes a useful kind of ornamentation. We may remark that the laminæ are not so conspicuous as to make sharp lines; indeed, the minerals are quite as much interlocked with each other, as in many of the other excellent fine-grained granites of the county, the only difference being that there is a general disposition of the three minerals to lie in definite planes, which is much more conspicuous on large polished surfaces than on small hand specimens. The mica is black and brown, the other two minerals being white with a slight tinge of blue. Iron pyrites are also present in very minute quantities.

The stone lies in "beds" sloping to the north-east, and large blocks are raised and polished, being especially adapted to monumental and architectural purposes, used both at home and abroad.

Kingswells, near Aberdeen.—Some authors state that granite is quarried here, but we are informed by the owner of the land that no such quarries exist. About thirty years ago the land was cleared of many large blocks of granite in order to bring it into a cultivated state, and some of this stone was worked up, being blasted on the spot. Specimens of it were also prepared and exhibited in London: this was the way in which the mistake probably arose.

The stone was originally selected for Prince Albert's Mausoleum, for which purpose, however, it was not used, as the supply was found to be irregular.

Mission-Room, Tunbridge Wells.—The dedication stone was laid by Mrs. Weare, on the 6th inst., of the new Church Mission-Room, High Brooms, Tunbridge Wells, now in course of erection from the designs of Mr. Brett A. Elphicke.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

12,251, Uptake Ventilators and Smoke Cowls. W. McHaffie.

The invention consists of a shaft or pipe, at the upper end of which a series of conic frustra is secured. The lower frustrum is placed with the base uppermost, to which base the base of another frustrum is connected. Above the second frustrum, another and similar frustrum is situated, with an annular space between it and the one last mentioned, which space is divided by ribs running the entire depth of the space into segments. Another frustrum is supported by columns, and the head of the ventilator is in the shape of an inverted cone. The effect of this arrangement of parts is that in whichever direction the wind acts upon the ventilator or cowl, an inducing current or up-draught is produced.

4,110, Discharge Valve of Closets. A. Abbott.

The improvement consists of a cast-iron spiral fixed in place of the pull-up rod. On the end of the lever is fixed a brass stud with rubber roller attached thereon. When the handle of the closet is turned round instead of being pulled up, the roller travels up the spiral, thus opening the valve. When the handle is released, the valve closes automatically.

12,252, Glazing. A. Drummond.

A ridge or feather of wood is secured or fixed to the upper side of the astragal or sash-bar, and strips of lead are folded over the edges of the glass to secure them in place. The sides of the central ridge are covered with strips of lead, and the sides of the glass abut against it, and the strips are folded over the edges of the glass.

6,365, Silent Door-closing. G. B. Thornton.

This is an improvement adapted for use with a former patent (No. 12,605, 1885). A plate is formed with two small bars projecting from one side to receive the cushion part of the block of india-rubber between them, another portion of this block forming an elastic backing behind the said bars; or a block or cushion is inserted in the nose of the catch instead of the plate. This entirely remedies the jarring noise occasioned by the catch of the lock striking against the plate inserted in the framing of the door.

NEW APPLICATIONS FOR PATENTS.

Sept. 3.—11,220, G. and J. Falter, Levelling Instrument.—11,233, H. Doulton, Bristol Stoneware.

Sept. 4.—11,250, S. Sparkes, Stoneware Socket Pipes.—11,256, W. Allan, Venetian Blinds.—11,266, J. Jones, Hanging Sash Windows.—11,268, T. and K. King, Dry Closets, &c.—11,271, F. Bosshardt, Intercepting Noises caused on Floors, &c., and Excluding Draughts from Buildings.—11,292, T. Galloway, Locks, Latches, and Bolts.—11,294, T. Whitehead, Chimney-tops, Cowls, &c.

Sept. 6.—11,310, A. Fowler, Privies and Water-closets.

Sept. 7.—11,360, G. Soper, jun., Hanging Sashes.—11,371, H. Haddan, Veneering.—11,377, W. Bull, Tiles for Roofing, &c.

Sept. 8.—11,435, R. Bucknall, Walls and Roofs of Temporary Buildings.

Sept. 9.—11,449, J. Shanks, Traps for Drain, Soil, or Waste Pipes.—11,453, W. Fox, Joiners' Drilling and Boring Braces.—11,454, R. Hunter and J. Turnbull, Kitchen Ranges.—11,460, T. Robson, Window Frames and Sashes.—11,483, C. Groombridge and J. Rickman, Window Sash Fastening.—11,486, F. Shipton and J. Thame, Washable and Sanitary Wall Hangings.—11,494, A. McLean and R. Smith, Pigments.

PROVISIONAL SPECIFICATIONS ACCEPTED.

9,265, H. Coombs, Holding and Securing Window Sashes in any desired position.—10,262, J. Stapleton, High-pressure Flushing-tank and Water Preserving Cistern.—10,723, H. Ramsden, Stoves.—10,853, A. Frey, Ventilating Stove or Fireplace.—10,944, J. Starley, Screws and Screw-drivers.—7,877, J. Peace, Window-sash Fastener.—8,836, E. Bassett, Asphalte Pavement.—9,378, R. Guest, Edging Tile and Gutter.—9,608, G. Newman, Pneumatic Door Checks and Combined Door Checks and Spring.—9,643, H. Lake, Construction of Walls, Ceilings, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

12,477, G. Smith, Chimney Cowl or Ventilator.—12,700, J. Westmorland, Ventilation and Construction of Buildings.—12,754, G. Newman, Floor Springs for Swing Doors.—12,868, A. Barr, Stair Railings.—13,110, W. Lake, Facilitating the Nailing of Laths.—13,271, S. Sutcliffe, Tile Grate-fronts and Tile Grates and Chimney-pieces combined.—13,406, W. Richards, Sliding Gaseliers.—14,060, W. Cliff, Water-closets.—15,195, E. Coldwell, Burning off Old Paint.—7,310, H. Smith and E. Bradley, Veneer and Lumber Cutters.—8,793, G. Schuritz, Casement Stays.—11,128, C. Heywood, Water-closets.—13,143, F. Chambers, Shop-fronts.—13,595, A. Brookes, Artificial Stones or Marbles.—13,692, C. Parsons, Wood Sawing and Slicing Machines.—7,161, B. Whiting, Window-sash.—9,408, H. Leigh, Ornamental Masonry Columns.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

SEPTEMBER 7.

By E. J. GAIRDNER.

Mile End—76, Baker's-row, freehold	£390
86 to 94 even, Baker's-row, freehold	1,335
98, Baker's-row, freehold	680
Freehold ground-rents of 22*l.* per annum, reversion in four years	3,185
120 to 138 even, Buxton-street; and 5 and 6, Buttress-street, freehold	2,735
140, Buxton-street; 91, 93, and 95, Underwood-street; and 59 to 69 odd, Baker's-row, freehold	1,875

By WATSON & BROWN.

Tufnell Park—13, St. George's-avenue, 90 years, ground-rent 7*l.* 7s.	500
Camden-road—No. 321, 60 years, ground-rent 8*l.*	630
Holloway—8, Hargrave-road, 74 years, ground-rent 6*l.*	305
12, Hargrave-road, freehold	455
A plot of freehold land in Lambton-road	240
Stanwell—A freehold cottage called St. Mary's	245
Belgravia—6, Bessborough-street, 41 years, ground-rent 10*l.*	530

SEPTEMBER 8.

By ALFRED RICHARDS.

Tottenham, Northumberland Park—Blenheim Villa, freehold	700

By C. & H. WHITE.

Pimlico—3 and 8, Hindon-street, 38 years, ground-rent 10*l.* 10s.	890

By R. BOYCE.

Stratford—18a and 20 to 50 even, William-street, freehold	4,250
69 to 75 odd, Martin-street, freehold	1,340
57, Western-road, freehold	200
85, 87, and 89, Station-street, freehold	490
Hackney—73, Mansford-street, freehold	430
24, Teesdale-street, freehold	345
2 and 3, Claremont-street, freehold	405
Bow—298, Roman-road, freehold	700

SEPTEMBER 9.

By A. & G. GUIVER.

Ponder's End—1 to 7, High-street, freehold	2,400
"Smith's Wharf," and 1a. 2r. 0p., freehold	350

By C. C. & T. MOORE.

Ilford, High-road—The residence Elmwood, freehold	400
Forest Gate—182, Sebert-road, freehold	405
South Hackney—165 and 167, Victoria-road, 65 years, ground-rent 14*l.*	830

By J. K. COLEMAN.

Bow—1 and 6, Coborn-street; Coborn Lodge; and ground-rents of 16*l.* per annum, 31 years	1,020

SEPTEMBER 10.

By RICE BROS.

Bermondsey—93, Abbey-street, freehold	530
48, Upper Grange-road, 24 years, ground-rent 5*l.* 5s.	200

By GIDDY & TURNER.

Cricklewood—The residence called Thornbank, 83 years, ground-rent 69*l.*	1,600

Miscellanea.

The Circulation of Underground Waters. In the Geological Section of the British Association meeting at Birmingham last week, Mr. C. E. De Rance, F.G.S., read the twelfth report of the committee of inquiry into the circulation of underground waters. During the thirteen years that the investigation had been going on much accurate and valuable information had been obtained. The complete dependence of the supply of underground waters on the proportion of annual rainfall, varying with the amount of rainfall and the character and porosity of the strata on which the rain fell, had been completely established; varying from 1 in. to 12 in. of rainfall annually absorbed on each square mile, 1 in. of rain giving 40,000 gallons per day for each square mile of surface exposed. The great value of underground supplies had been shown during severe drought, the dry weather flow of the streams and rivers being wholly dependent on underground supplies issuing as a deep-seated spring. That a large quantity of water could be obtained by deep wells in suitable situations was well shown by the Corporation supply at Birmingham. The Aston well yielded 3 million gallons a day, the Witton well 2½ millions, King's Vale a quarter of a million, Perry well 2 millions, Selly Oak well 1¼ millions, giving a total supply from wells of 9 million gallons a day; the remaining supply of Birmingham of 7½ million gallons a day was derived from streams. The total supply of 16¼ million gallons a day is not required. The actual demand being only 12 million gallons. Large supplies of pure artesian-well water, obtained and used at Nottingham, Liverpool, Birkenhead, and other cities had also been investigated.

Manchester Jubilee Exhibition.—We hear that it has been finally decided by the Executive Committee to represent the old towns of Manchester and Salford at this forthcoming exhibition, and that the work is to be carried out in a novel and artistic way. To this end the work has been placed in the hands of Messrs. Darbyshire & Smith, architects, Manchester.

Sales of Building Sites.—Messrs. E. & H. Lumley, of St. James-street, had another successful (their eighth) sale by auction at Lee-on-the-Solent, on the Hampshire Coast, on the 8th inst., when forty-one lots out of forty-five were sold at prices averaging 50*l.* per plot, or about 500*l.* per acre.——On Monday morning a special train left the Holborn Viaduct Station of the London, Chatham, and Dover Railway, conveying a numerous company to Birchington-on-Sea, where a sale of sixty-two plots of freehold building land by Messrs. Baker & Sons had been announced to take place. The property offered consisted of a portion of the Cliff Estate at Birchington, which was some time since purchased by a Metropolitan land company, who have laid the estate out for building purposes by the construction of several intersecting roads, the principal road, being designated Beach-avenue, laid out as a boulevard, and running in a north-easterly direction to the sea from the south boundary of the estate. The estate is situated on the summit of a bold cliff. Major Bell, the owner of some of the bungalows which form a feature of the place, is at present expending a large sum in the erection of a sea-wall in front of the chalk cliffs, to the height of 40 ft. above high-water mark. The northern portion of the Cliff Estate, facing the sea, and comprising an area of about four acres, is to be laid out as pleasure-grounds. At the sale, the plots having frontages of 25 ft. and a depth of 115 ft. were sold at from 35*l.* to 40*l.* each; those having frontages of 33 ft. and a depth of 170 ft. realised from 88*l.* to 90*l.*; and those having frontages of 50 ft. and a depth of 170 ft., were sold at from 140*l.* to 170*l.* each. All the plots submitted were disposed of, the total proceeds of the sale amounting to about 3,200*l.* During the progress of the sale it was objected that the stipulations as to the building values of the houses to be erected on the estate were too stringent and severe, the conditions stipulating that several of the houses were to cost not less than 1,000*l.* each, and others not less than 800*l.*, 600*l.*, and 500*l.* On behalf of the vendors the auctioneer announced that, in certain cases, the required cost of the houses would be reduced.

Association of Municipal and Sanitary Engineers and Surveyors.—In connexion with the Home Counties District, there will be a visit to Rochester, on Friday next, September 24th. The members will proceed to the Council-chamber, and the following paper will be read and discussed:—"Public Health Act—the 150th Section—Remarks on its operation, and suggested remedies for its defects." By Mr. W. Spinks, A.M.Inst.C.E., Dukinfield. Afterwards the members will visit the Steam Road Roller Works of Messrs. Aveling & Porter, and the Works of the Burham Cement Company. If time permit after the inspection of these works, visits will be paid to the Cathedral and the Castle, prior to taking the 6 p.m. train to Victoria. On the following day, Saturday, September 25th, there will be a visit to Walthamstow, to inspect the Sewage Works, under the guidance of Mr. Jerram, who will explain the works. Afterwards, the party will go to the East London Water Works Pumping Station at Lea Bridge, where Mr. Bryan, the Engineer of the Company, will receive the members. Thence by carriages to Copper Mill-lane for inspection of turbine, and afterwards to new Pumping Station at Chingford Mills. It is proposed that the members should afterwards dine together at the Forest Hotel, Chingford.

The School of Art Wood-Carving, which was formerly held at the Royal Albert Hall, South Kensington, but was removed a year ago to the City and Guilds Institute, Exhibition-road, has been re-opened after the usual summer vacation, and we are requested to state that one or two of the free studentships in the evening classes maintained by the Institute are vacant. During the past year the students have been engaged on several chimney-pieces and other architectural works, the revival of architectonic carving being one of the principal aims of the committee of the School. To bring the benefits of the School more within the reach of the artisan class, a remission of half fees for the evening class has been made to artisan students connected with the trade, and instruction by correspondence is also given. Forms of application for the free studentships, and all further particulars relating to the School, may be obtained from the Manager.

Apparatus for Determining the Hardness of Metals.—In the Mathematical and Physical Science Section of the British Association meeting at Birmingham, Mr. Thomas Turner described an apparatus which he has invented for determining the hardness of metals. He said that hitherto there had been few attempts to quantitatively determine the relative hardness of metals. The method adopted by the United States Government in 1856 consisted in the punching of a hole by a tool in the form of a pyramid and under a constant pressure. The indentation was carefully measured, its capacity calculated, and in this way relative hardness was expressed. But it had been shown that the results obtained really depended upon combined tenacity and hardness, and so were not accurate representations of hardness. The apparatus recommended by the author was an adaptation of the method which had already been employed in determinations of the hardness of minerals, namely by scratching the surface with a weighted diamond. The diamond is attached to a graduated beam, arranged so as to allow of motion in both a horizontal and a vertical plane. By means of a sliding weight sufficient pressure is applied to cause a distinct scratch on drawing the diamond over a smooth surface of the metal to be tested. The weight is then moved until the diamond just ceases to produce a visible scratch, when the position of the weight on the scale is observed. Some experience and care was necessary in observing the scratch, but when that had been obtained the apparatus gave uniform results. The author said his experiments with cast iron had shown that the common idea that hardness and tenacity necessarily accompanied each other was erroneous. Very soft cast iron could be obtained with a high tensile strength, while hard cast iron had very often a low tensile strength. When metal had to be worked unnecessary hardness led to useless expenditure of power and loss of tools, and in such circumstances a soft metal was much to be desired. The apparatus was intended to be used in connexion with tensile tests of the metal, and in that way afforded valuable information as to the mechanical properties of the material.

The Use of Compressed Air in Birmingham.—In the Mechanical Science Section of the Birmingham meeting of the British Association for the Advancement of Science, Mr. J. Sturgeon contributed a paper on "The Birmingham Compressed-air Power Scheme." After pointing out the objects of the scheme, and showing that the large number of engines of moderate size used in Birmingham, often intermittently, rendered some such system peculiarly applicable to the town, the author pointed out that, although each 1,000-horse-power at the central station might only produce 500 effective horse-power at the users' engines, it would displace fully 1,000 horse-power of small boiler plant, furnaces, chimneys, &c., and the same engines could be used with compressed air as with steam. The centralisation principle enabled engines and boilers to be used of large power, with all modern improvements, such as high-pressure triple expansion, gas-firing, &c. At the pressure proposed (45 lb.), the air-driven engines would indicate from 30 to 65 per cent. of the power developed at the main engines, according to the mode of using the compressed air. According to the investigations of Sir F. Bramwell and Mr. Percy, on behalf of the Birmingham Corporation, the present consumption of fuel in small engines of from four to twenty-five horse-power varies from 36 lb. to 8½ lb. per horse-power per hour; and, as it was estimated that compressed-air power would reach the consumer at an expenditure of from 5 lb. to 2·3 lb. fuel per horse-power per hour, a saving of from 70 to 400 per cent. is effected. It was pointed out that compressed air could be used for all purposes for which steam was employed, except heating; air, on the other hand, had the advantage over steam that it was available for refrigeration.

Archæology at the British Association Meeting.—In the Anthropological Section, Mr. R. G. Haliburton read some notes on the use of the tau cross, basing his remarks on an ornament which had been brought from Queen Charlotte's Island, and which distinctly bore the symbol. He pointed out the extensive prevalence of the use of the letter in remote and modern times, and said it seemed to foreshadow a sacred symbol of the faith upon which the whole world depended. The use of the tau cross was found in all parts of the world. Sir William Dawson showed some photographs of the recently discovered and examined mummies of Seti VI., Ramses II., and Ramses III., and, by request of Dr. Schweinfurth, of Cairo, he drew attention to the fact that mummies when unrolled decay rapidly, and asked that the Association should exert its influence on behalf of the preservation of these precious relics, either by urging that they should be restored to their wrappings or placed in air-tight cases, so that they might escape the destruction which had fallen on so many mummies in European museums. On the proposition of the President of the Section (Sir George Campbell), seconded by Mr. A. Albright, it was resolved:—"That this Section instructs its representatives on the Committee of Recommendations to submit the earnest request of this section that moral or material aid, or both, shall be given to Dr. Schweinfurth towards preserving the ancient mummies recently discovered in Egypt."

Brookfield Unitarian Church, Gorton, Manchester.—This church, which for some weeks has been in process of cleaning and decoration, was reopened on the 29th ult. with special services. The work in the church was begun in May. The space over the chancel arch has been filled with a representation of an angelic choir, five angels near the roof forming a group by themselves, with "Alleluia" on a scroll, and lower down two other angels holding a scroll, with the words "Gloria in excelsis Deo, et in terra pax." The chancel arch and wall margins are decorated in keeping with the picture. The spandrels of the nave contain rich Gothic foliage designs, a medallion in the centre of each having a representation, where possible a portrait of an Apostle, Reformer, or other great man. The list comprises the Apostles Peter and Paul, the Venerable Bede and King Alfred, Wycliffe and Erasmus, Calvin and Servetus, Socinus and Baxter, Priestley and Channing. Bands of fret ornaments, small battlement designs, &c., complete the treatment of these spandrels. The tones of colour are olive, citron, chocolate, &c., upon a groundwork of vellum colour. The aisle walls and the west wall have decorations in similar tones, with bands of pomegranate designs, quatrefoil ornamentation, &c. Upon the east wall of the south aisle a panel has been formed containing the Beatitudes. In the chancel the walls have been diapered of Gothic rose-foliated design, with bands and borderings. The most important work here is, however, on the walls to the right and left of the window. On one side is a figure of Moses, with the Tables of the Law, and on the other a picture of Christ as the Good Shepherd. These figures are enclosed in a setting of canopy work and other enrichment. The work has been carried out, under the direction of the architects, Messrs. Worthington & Elgood, by Mr. Reuben Bennett, of South King-street, Manchester; and the pictures have been painted by Mr. J. Milner Allen, of London.

Highgate Woods.—Mr. H. R. Williams, the Chairman of the Hornsey Local Board, has given notice that at the next meeting he will make a statement and move a resolution that the wood known as Churchyard Bottom Wood be acquired by the Board for the use and recreation of the public. This wood is fifty-two acres in extent, and is represented as one of the finest pieces of woodland in England; it is separated from the wood lately given to the Corporation only by a public road, and the price asked for it by the Ecclesiastical Commissioners is 25,000*l*. The acquisition of this wood as an open space would be a fitting complement to the one already made public. The two would form a noble and unique recreation-ground for the whole of the northern portion of the metropolis.—*City Press.*

Lectures for Sanitary Inspectors.—The Council of the Parkes Museum, 74A, Margaret-street, W., have issued the syllabus of a course of lectures and demonstrations which are intended for the special instruction of those desirous of obtaining knowledge of the duties of sanitary inspectors. It is proposed to repeat the course twice each year, to suit the requirements of persons preparing for the examination of the Sanitary Institute of Great Britain; the lectures will comprise all the subjects scheduled for those examinations. The course will have a further use in supplying the wants of acting inspectors and of other persons desirous of obtaining a practical knowledge of sanitary requirements and regulations. At the close of each lecture, students will be allowed to ask questions upon the subject treated. The lectures will be given on Mondays, Wednesdays, and Fridays at 8 p.m., in the Parkes Museum, 74A, Margaret-street, W., and students attending the course will be granted free admission to the Museum and Library from October 1st to November 13th. In order to put it within the power of every one to attend the lectures, a nominal fee only will be charged to cover the necessary expenses. The introductory lecture will be given on Tuesday, October 4, by Dr. G. V. Poore, who will treat of the "General History, Principles, and Methods of Hygiene."

Gas-Lighting by Incandescence.—This was the subject of a paper read before the British Association at Birmingham last week, by Mr. Conrad W. Cook. It described the invention of Dr. Carl Auer von Welsbach, of Vienna, which consists in impregnating fabrics of cotton or other substances, made into the form of a cylindrical hood or mantle, with a compound liquid composed of solutions of zirconia and oxide of lanthenum (or with solutions of zirconia with oxides of lanthenum and Yttrium), which mantle, under the influence of a gas flame, is converted into a highly refractory material capable of withstanding for long periods without change the highest temperatures which can be obtained from the most efficient form of atmospheric burners, and which under the influence of such temperature, glows with a brilliant incandescence, very white and perfectly steady, and which, moreover, retains its woven or reticulated character; the organic volatile and carbonaceous matters being entirely burned out and replaced by an incombustible and highly refractory residual skeleton, which becomes by its brilliant incandescence the source of light in the burner. It is asserted that the light emitted is, at a distance, hardly distinguishable from a twenty-candle incandescent electric lamp, and by a modification of the composition of the impregnating liquid a yellower light is obtained, resembling that of the best gas-lights, but much more brilliant, and with a saving of gas of from fifty to seventy-five per cent.; and being perfectly smokeless it is incapable of blackening ceilings and internal decorations. It is stated that the illuminating power of the lights is about ten candles per cubic foot of gas consumed, and that the mantles last from 800 to 1,000 hours.

Ainsdale.—The memorial-stone in connexion with the new church at Ainsdale, near Southport, has been laid, on behalf of the trustees of the building fund, by Dr. G. B. Barron, J.P. The style of architecture adopted is sixteenth-century Gothic. The exterior will be of the best selected Burnley bricks, with terra cotta heads, sills, weatherings, &c.; the windows of the nave and large east and west windows being filled with tracery of an elaborate design; the gables being panelled in terra-cotta and in timber and cement. The roof will be covered with the best Welsh slates in ornamental bands. The interior comprises entrance-porch and vestibule, nave chancel, transept, vestry, &c. The church, when complete, will, we are informed, accommodate 350 persons at the very low cost of a little over 4*l*. 10s. per head. Provision has been made for ample extension of the church, and the site, which has generously been given by Mr. Weld Blundell, contains sufficient area to accommodate the church and extensions, and intended parsonage and school. The architect is Mr. C. A. Atkinson, of Liverpool; and the contractor Mr. Riding, of Ormskirk. The heating apparatus will be provided by Messrs. Bennett Bros., of Liverpool.

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	6	10	0	7	0	0
Teak, E.I. ....load	9	0	0	14	0	0
Sequoia, U.S. ....foot cube	0	2	4	0	2	7
Ash, Canada ....load	3	0	0	4	10	0
Birch ,, ...	2	10	0	4	0	0
Elm ,, ...	3	10	0	4	10	0
Fir, Dantsic, &c.	1	10	0	4	0	0
Oak ,, ...	2	10	0	4	10	0
Canada	3	0	0	6	0	0
Pine, Canada red	2	0	0	3	10	0
,, yellow	2	5	0	4	0	0
Lath, Dantsic ....fathom	3	0	0	5	0	0
St. Petersburg	4	0	0	5	10	0
Wainscot, Riga....log	2	15	0	4	0	0
,, Odessa, crown	3	5	0	3	7	6
Deals, Finland, 2nd and 1st...std. 100	7	0	0	8	0	0
,, 4th and 3rd	6	0	0	7	0	0

TIMBER (*continued*).	£.	s.	d.	£.	s.	d.
Deals, Riga	5	10	0	7	0	0
St. Petersburg, 1st yellow	8	0	0	14	0	0
„ 2nd „	7	0	0	8	0	0
„ white	7	0	0	10	0	0
Swedish	6	0	0	15	0	0
White Sea	7	0	0	17	10	0
Canada Pine, 1st	17	0	0	30	0	0
2nd	12	0	0	17	0	0
„ 3rd, &c	6	0	0	10	0	0
„ Spruce 1st	8	0	0	11	0	0
„ 3rd and 2nd	5	0	0	7	10	0
New Brunswick, &c.	5	0	0	7	0	0
Battens, all kinds	4	0	0	12	0	0
Flooring Boards, sq. 1 in., Prepared, first	0	9	0	0	13	0
Second	0	7	6	0	8	6
Other qualities	0	5	0	0	7	0
Cedar, Cuba, foot	0	0	3	0	0	3½
Honduras, &c.	0	0	2½	0	0	3½
Australian	0	0	2	0	0	3
Mahogany, Cuba	0	0	4	0	0	7
St. Domingo, cargo average	0	0	4	0	0	7
Mexican „	0	0	3½	0	0	4½
Tobasco „	0	0	4	0	0	6½
Honduras „	0	0	4½	0	0	6½
Maple, Bird's-eye	0	0	6	0	0	8
Rose, Rio ton	7	0	0	10	0	0
Bahia	6	0	0	10	0	0
Box, Turkey	5	0	0	17	0	0
Satin, St. Domingo foot	0	0	7	0	0	11
Porto Rico	0	0	8	0	1	2
Walnut, Italian	0	0	4	0	0	5
METALS.						
IRON—Pig, in Scotland ton	0	0	0	0	0	0
Bar, Welsh, in London	4	7	6	4	15	0
„ „ in Wales	4	2	6	4	7	6
„ Staffordshire, London	5	10	0	6	0	0
Sheets, single, in London	6	15	0	8	10	0
Hoops „	6	0	0	7	0	0
Nail-rods „	5	10	0	6	10	0

METALS (*continued*).	£.	s.	d.	£.	s.	d.
COPPER—						
British, cake and ingot ton	42	0	0	42	10	0
Best selected	42	10	0	43	0	0
Sheets, strong	47	10	0	48	0	0
„ India	44	10	0	45	10	0
Australian	0	0	0	0	0	0
Chili, bars	39	17	6	40	5	0
YELLOW METAL lb.	0	0	3½	0	0	4½
LEAD—						
Pig, Spanish	12	16	3	0	0	0
English, common brands	13	2	6	0	0	0
Sheet, English	14	0	0	14	2	6
SPELTRE—						
Silesian, special ton	13	15	0	13	17	6
Ordinary brands	13	10	0	13	12	6
TIN—						
Banca ton	0	0	0	0	0	0
Billiton	0	0	0	0	0	0
Straits	100	0	0	0	0	0
Australian	100	2	6	0	0	0
English ingots	103	0	0	0	0	0
ZINC—						
English sheet ton	18	0	0	18	5	0
OILS.						
Linseed ton	21	10	0	21	15	0
Cocoanut, Cochin	33	0	0	0	0	0
Ceylon	25	10	0	25	15	0
Copra	0	0	0	0	0	0
Palm, Lagos	23	10	0	0	0	0
Palm-nut Kernel	0	0	0	0	0	0
Rapeseed, English pale	21	15	0	0	0	0
„ brown	20	5	0	0	0	0
Cottonseed, refined	19	0	0	20	0	0
Tallow and Oleine	25	0	0	45	0	0
Lubricating, U.S.	6	0	0	10	0	0
„ Refined	8	0	0	13	0	0
TURPENTINE—						
American, in casks cwt.	1	6	6	1	6	9
TAR—Stockholm barrel	0	15	0	0	15	6
Archangel	0	10	6	0	11	0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Art Gallery and Museum	Leeds Corporation	Not stated	October 16th	ii.
New Market Buildings	Carlisle Corporation	100*l.* and 50*l.*	Nov. 20th	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Reservoir, &c.	Horsforth Waterwks Co.	McLandsborough & Preston	Sept. 20th	ii.
Roof over Reservoir	Guildford U. S. A.	*Official*	do.	ii.
Erection and Enlargements of Schools	School Brd for London	do.	Sept. 21st	ii.
Providing, &c., Bookcases to Library	Wimbledon Local Brd.	Potts, Sulman, & Hennings	Sept. 22nd	ii.
Artisans' Dwellings, Bermondsey	.....	A. E. Purdie	Sept. 23rd	xviii.
Fire Brigade Station	Met. Board of Works	*Official*	Sept. 27th	ii.
Lamp Columns	Willesden Local Board	O. C. Robson	Sept. 28th	ii.
Guernsey Granite (Broken)	do.	do.	do.	ii.
Construction of Wharf Wall	West Ham Local Brd.	Lewis Angell	do.	ii.
Making-up Road	Wandsworth Bd. of Wks	*Official*	do.	xviii.
Paving Footways	Greenwich Bd. of Wks.	do.	Sept. 29th	xviii.
Embankment Walls	do.	do.	do.	xviii.
Extension of Lunatic Asylum	City of Bristol	H. Crisp	do.	ii.
Road-Making and Paving	Hammersmith Vestry	*Official*	do.	xviii.
Ironwork for Bridges	Midland Railway Co.	A. A. Langley	October 1st	ii.
Painting, &c., Works, Darenth	Met. Asylums Board	A. & C. Harston	October 4th	ii.
Passenger Station	North London Ry. Co.	*Official*	October 6th	ii.
Four Shops	do.	do.	do.	ii.
Road-Making	South Hornsey Local Bd	E. Fry	do.	ii.
Erection of Infectious Hospital	Kingston R.S.A.	Jacomb Gibbon & Woodroffe	October 13th	ii.
Fortification Works Bucharest	Kingdom of Roumania	Not stated	Nov. 13th	ii.
Stabling, Camden Town	.....	C. R. Baker King	Not stated	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Clerk of the Works	Northwich Local Brd	Not stated	Sept. 21st	xvi.
Clerk of Works	Civil Service Com.	do.	October 7th	xvi.

TENDERS.

BEAUMARIS.—For new house at Beaumaris, for Mr. O. J. Pritchard. Mr. R. G. Thomas, architect, Menai Bridge:—

Gabriel Lloyd, Beaumaris (accepted)	£430 0 0

BROMPTON (Middlesex).—For repairs and alterations to No. 202, Fulham-road, the West Brompton Branch of London and South-Western Bank. Messrs. T. & W. Stone, architects, Great Winchester-street, London Wall:—

R. W. Haslock	£548 0 0
A. E. Braid	520 0 0
Lascelles & Co.	457 0 0
Bright & Co. (too late)	455 0 0
H. Smith & Son (accepted)	440 0 0

CLERKENWELL. — For the erection of printing warehouse, Clerkenwell-road, for Messrs. Gilbert & Rivington, Limited. Mr. W. Seckham Witherington, F.R.I.B.A., architect, Mark-lane:—

C. Kearley	£3,967 0 0
Stanley Bird	3,908 0 0
Grover & Sons	3,769 0 0
W. Shepherd	3,740 0 0
Priestley	3,585 0 0
Elkington	3,500 0 0
Patman & Fotheringham	3,473 0 0

HAMPSTEAD.—For repairs and alterations to the Holly Bush Assembly Rooms, Hampstead, for the Hampstead Constitutional Club:—

T. Potter	£385 0 0
H. Grey	362 10 0
W. H. Watts	345 0 0
Roff & Son	340 0 0
G. Cook (accepted)	263 15 0
Pritchard & Son*	252 0 0

* Withdrawn.

HASTINGS.—For erecting four houses in Stonefield-road, Hastings, for Mr. J. Jassell. Mr. A. A. G. Colpoys, architect, Hastings. Quantities supplied:—

P. Jenkins	£1,880 0 0
A. Vidler	1,860 0 0
A. H. White	1,840 0 0
F. C. Cruttenden	1,827 0 0
C. Hughes	1,820 0 0
J. W. Morris	1,819 0 0
H. L. F. Rodda	1,798 0 0
J. Elliott	1,758 0 0
D. H. Snow	1,740 0 0
Moon & Garner	1,634 0 0
W. Coussens	1,620 0 0
W. Duffie	1,576 0 0
A. Ashdown	1,559 0 0
J. Lester	1,490 0 0
Wm. Elliott	1,480 0 0
W. E. Warman	1,450 0 0
G. Austin (accepted)	1,185 0 0
P. Fryer	1,065 0 0

ISLINGTON.—For alteration and addition to No. 231, Upper-street, for Mr. H. Williams. Mr. William Smith, architect, Gresham-buildings:—

Sage & Co.	£593 0 0
Lark	434 0 0
Mattock Bros.	433 0 0
Dearing & Son	408 0 0
Langham	399 0 0
Drew & Cadman	385 0 0
Ward	383 0 0
Clark Bros.	370 0 0
Steel Bros.	310 0 0

KINGSLAND.—For extending the playgrounds, &c., at The Birkbeck Middle Class Schools, Kingsland. Mr. J. J. Thomson, architect. Quantities supplied:—

Laing	£387 0 0
Sargent	312 0 0
Exton & Burton, Birkbeck Works, Kingsland	311 0 0

LEYTON (Essex).—For additions to Newport-road Schools, for the Leyton School Board. Mr. J. T. Newman, architect. Quantities by Messrs. Curtis & Sons:—

Rose	£346 0 0
Thompson	278 0 0
Doubleday	220 0 0
Searle	193 9 0
Slade	193 0 0
Holland	186 0 0
Reeve	185 0 0
Read	177 0 0
Sayer	175 0 0
Walker	163 0 0
Ede	159 0 0
Bane	139 0 0
England & Thompson (accepted)	137 0 0

LLANGEFUI (North Wales).—For new house and shops for Dr. E. Williams, at Llangefui. Mr. R. G. Thomas, architect, Menai Bridge:—

Lewis Parry, Llangefui (accepted)	£1,200 0 0

LONDON.—For alterations at Nos. 38 and 39, Cow Cross-street, for Mr. H. M. Clarke. Mr. J. E. Saunders, architect:—

Bishop	£265 0 0
Colls & Sons	229 0 0
Staines & Son	218 0 0
Clarke	215 15 5

LONDON. — For painting and repairs to No. 64, Mornington-road, Regent's Park. Mr. Walter Barnett, surveyor, Queen-street, E.C.:—

Toms, Camden Town	£188 0 0!
Hawkins	170 0 0
Hallard	130 0 0
Gould & Brand	115 0 0
Grover & Son, New North-road	110 0 0
Stephens, New North-road (accepted)	98 0 0!

LONDON.—For the erection of new business premises, 372, Euston-road, and also the restoration of old entrance gateway to Messrs. Gray & Davison's Organ Factory, 374, Euston-road, for Mr. Frederic Davison. Mr. Frederic W. Fryer, architect, Beckenham:—

W. A. Rhodes, Marble Arch, W.*	£1,630 0 0

* Accepted. [No competition.]

LONDON.—For repairing and putting shop fronts to Nos. 25, 26, 27, and 28, Playhouse-yard, Whitecross-street. Mr. Brett A. Elphicke, architect, Great Queen-street, Westminster:—

E. Porter	£449 0 0
Wenden & Smith	425 0 0
J. Jarvis	385 0 0
J. Hawkins	367 0 0
J. Fanthorpe	297 0 0
S. Burns	289 16 0
J. Trill	239 18 0

MENAI BRIDGE.—For new English Presbyterian Chapel, Menai Bridge. Mr. R. G. Thomas, architect:—

Humphreys, Bangor	£5,750 0 0
Evan Parry, Menai Bridge	4,600 0 0
William Thomas, Bangor	4,580 0 0
Gabriel Lloyd, Beaumaris	4,490 0 0
Evan Williams, Bangor (accepted)	4,227 0 0
R. & J. Williams, Bangor	4,051 0 0

NORTH WALES.—For new buildings on the Baron Hill Estate, for Sir Richard Bulkeley, Bart. Mr. R. G. Thomas, architect, Menai Bridge:—

New Stables, Beaumaris.

Gabriel Lloyd, Beaumaris (accepted)	£260 0 0

Repairs to House, Beaumaris.

David Owen, Llandegfan (accepted)	£190 0 0

New Farm Buildings at Valley, Anglesey.

John Jones, Gaerwear (accepted)	£3[illegible]7 0 0

New Farm Buildings at Tan R'allt and Tal-y-Cafu (Mr. Conway's).

Samuel Parry, Llanrwst (accepted)	£396 11 0

Repairs to Merchllyn (near Conway).

Moses Parry, Gyffin (accepted)	51 0 0

NORTHWICH.—For laying water mains in connexion with the waterworks, from Cote Crook to Heywood Reservoir, for the Northwich Local Board:—

Oliver Norris, Heaton, Bolton-le-Moors	£24,473 12 5!
John Mackay, Stoke-upon-Trent	12,287 8 7
Holmes & Kershaw, Bradford	11,889 11 11
Walmsley & Co., Preston	10,500 0 0
Josiah Dale, Northwich	9,346 0 0
Walmsley & Co., Crumpsall	8,794 14 0
Frank Dawson, Bury	7,604 9 6
George Law, Kidderminster	7,161 0 0
James Dyson, Ellesmere, Shropshire	7,004 9 3
John Jowett, Rainhill	6,010 2 11
Pickthall & Sons, Merthyr-Tydvil	5,951 4 6
Small & Sons, Handsworth	5,880 17 2
John Brigg, Bingley	5,781 13 3
James Bush, Preston	5,687 1 0
James Holland, Castle-Northwich	5,241 5 2
Innes & Wood, Handsworth	4,994 16 3
C. F. McCulloch, Manchester	4,837 7 6
J. W. Pickthall, Yeovil and Southampton	4,572 13 6
William Drewitt, Alsager	4,525 1 11
W. Winnard, Wigan	4,458 4 4
H. W. Gould & Co., Southampton*	4,280 16 0
J. B. Mather, Hull†	3,026 11 8!

* Accepted. † Withdrawn.

NEW SHOREHAM (Sussex).—For works in connexion with the new cemetery, for the Burial Board. Mr. Arthur Loader, architect, Brighton:—

Entrance Lodge and Lych Gate.

S. C. Smale	£742	0	0!
E. John Ockenden	707	0	0
Jabez Reynolds, Jun.	679	10	0
J. M. Newnham	677	0	0
William Still	650	0	0
George Box	628	0	0
Peter Peters	614	0	0
Wm. Taylor	609	0	0
G. R. Lockyer	597	0	0
Wm. Hackman	595	0	0
James Longley	595	0	0
Watson	590	0	0
Patching & Sons	566	0	0
Simeon Norman	560	0	0
Wm. Homewood	547	0	0
S. E. Frayne	573	13	0
Edgar Seaber	439	0	0
James Blaker	427	0	0
Stanbridge	425	0	0
Chas. Curd	418	8	0
W. A. Gates, Shoreham (accepted)	385	7	0
Geo. Burchell	378	14	6!

Iron Enclosure, Fence, &c.

Roger & Co.	741	0	0!
Wm. Homewood	414	14	0
James Longley	402	0	0
Badham & Co.	331	13	6
William Still	325	3	0
William Taylor	321	8	0
E. John Ockenden	311	0	0
Goddard & Massey	298	10	0
Wayman & Johnson	290	0	0
Hitching & Wynn	279	12	0
Howell	277	16	6
Faulkner & Sons	277	6	0
Reed & Sons	270	12	0
Jabez Reynolds, Jun.	268	18	0
Peter Peters	267	17	0
W. Burtenshaw	267	0	0
J. W. Holloway	265	12	0
Lampen & Co.	265	10	0
Brookes & Co.	253	3	6
C. Smith & Sons	228	13	0
Iron, Wire, Wire Rops, and Fence Company	222	1	4
S. E. Frayne, Kidderminster*	149	11	2!

* Accepted.

Formation of Roads and Paths.

Jabez Reynolds, Jun.	349	0	0!
Badham & Co.	274	9	0
Wm. Still	166	1	0
E. John Ockenden	132	0	0
James Longley	126	0	0
S. E. Frayne	124	5	5
S. Marshall	117	0	0
George Burchell	103	10	0
James Harrison	103	0	0
Rupert Miller	103	0	0
Wm. Homewood	87	0	0
Peter Peters	80	15	0
Chas. Curd, Shoreham (accepted)	65	0	0!

SHOREDITCH.—For taking down and rebuilding Public Mortuary at Shoreditch:—

Church & Co.	£420	0	0!
Ivory & Son, Hackney	370	0	0
Steel Bros., Dalston	350	1	0
Harvey	330	0	0
Truley	308	0	0
Groom	300	0	0
Whiches	297	0	0
Thomerson, Hackney	292	0	0
Smith Bros., East-road	290	0	0
Sheffield & Cottrill	285	10	0
Webb, Old-street	285	0	0
Staines & Son, Great Eastern-street	267	0	0
Selway	260	0	0
Sharp, Kingsland	253	0	0
Thompson	251	10	0
Doubleday, Kingsland	250	0	0
Stephens, New North-road	248	10	0
Hutchings	247	5	0
Eade	244	0	0
Peppiart	243	0	0
Taylor & Birt	210	0	0
Saunders	205	0	0
Sirgell	198	0	0
Jarvis & Sons, Hackney-road*	195	0	0
Webb, Stratford	159	0	0!

* Accepted.

SNARESBROOK.—For alterations and finishing works to two Houses, Hermon Hill, Snaresbrook, for Lieut.-Colonel Kirby, J.P. Mr. J. B. Wall, architect, Walbrook, E.C.:—

H. Hickinbotham, Teddington	£1,364	7	0
S. Salt, Limehouse	1,099	10	0
D. Brown & Co., Camberwell	1,097	0	0
T. D. Leuz, Deptford	997	0	0
East & Co., Plaistow	825	0	0
M. Redman, Brockley	790	0	0

STEPNEY.—For a new Institute and Governor's House at Stepney, in connexion with Dr. Barnardo's Homes for Working and Destitute Lads. Mr. Richard Harris Hill, architect, Lombard-court:—

Brass	£15,600	0	0
Mowlem & Co.	14,785	0	0
Holliday & Greenwood	14,460	0	0
Chappell	14,343	0	0
Higgs & Hill	14,198	0	0
Holloway	13,950	0	0
Perry & Co. (accepted)	13,308	0	0

SUSSEX.—For mansion at Holly Hill, Sussex. Mr. J. Oldrid Scott, architect. Quantities by Messrs. J. S. Lee & Sons:—

Waters	£10,416	0	0
Dove Bros.	9,010	0	0
Barnes	8,560	0	0
Thompson	8,467	0	0
Berry & Bussey	8,452	0	0
Chapple	8,436	0	0
Lawrence & Son	8,348	0	0
Pledge	8,150	0	0
Cheesman	7,920	0	0
Smith	7,909	0	0
Box	7,774	0	0
Norman	7,643	0	0
Foster & Dixey	7,574	0	0
Dobson	7,534	0	0
Longley (accepted)	7,246	0	0

[Foundations already put in.]

TUNBRIDGE WELLS.—For the foundations of the chancel of St. Barnabas' Church, and for organ chamber, vestries, and two bays of nave and aisles (average 21 ft. deep) and groined mortuary chapel in basement. Messrs. J. E. K. & J. P. Cutts, architects, London:—

G. Punnett & Sons, Tunbridge	£2,033	0	0
G. Mansfield & Son, Tunbridge Wells	1,997	0	0
W. Oakley, Tunbridge Wells	1,900	0	0
J. Jarvis, Tunbridge Wells	1,755	0	0
J. Holloway, London	1,690	0	0
E. J. Strange & Sons, Tunbridge Wells	1,686	0	0
Beale & Son, Tunbridge Wells	1,635	0	0
T. Williams, London (accepted)	1,569	0	0

WEST HAM.—For extension of Grange-road Schools for the West Ham School Board. Mr. J. T. Newman, architect. Quantities by Messrs. Curtis & Sons:—

	Buildings.	Foundations.	Total.
Wall Bros.	£3,610	£645	£4,255
Cattley	3,545	630	4,175
Wood	3,497	620	4,117
Hoskings	3,553	559	4,112
Morter	3,443	597	4,040
Hearle	3,420	592	4,012
Nightingale	3,437	515	3,952
Boyce	3,337	540	3,879
Cox	3,297	525	3,822
Reed	3,274	518	3,792
Gregar	3,120	497	3,617
Stimson*	3,080	490	3,570

* Accepted, subject to approval by Department.

WOOLWICH.—For rebuilding The Princess of Wales Beer-house, Mount-street, Woolwich, for Mr. J. Bull. Mr. H. H. Church, architect, Woolwich:—

Booth, Hackney	£1,358	0	0
Lonergan Bros., Plumstead	1,290	0	0
Covil, Woolwich	1,260	0	0
Coombs, Plumstead	1,250	0	0
Johnson, Woolwich	1,239	0	0
Harris, Woolwich	1,228	0	0

WOOLWICH.—For alterations and repairs at No. 44, New-road, Woolwich, for Dr. Hogg. Mr. H. H. Church, architect:—

Johnson	£227	10	0
Covil	212	10	0
How	208	0	0

[All of Woolwich.]

WORTHING.—For the erection of dwelling-house and offices, Cambridge-road, Worthing. Mr. W. Moore, architect:—

A. G. Wright, Broadwater (accepted)	£1,118	0	0

TO CORRESPONDENTS.

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T. & G. (plan received).—"A Vestryman of St. Martin's" (we cannot publish letters sent anonymously; the name need not be for publication, but must be communicated).—F. P. T. (appeared last week).—J. A.—C. C.—C. S.—I. C. Co.—G. R. A.—J. P.—H. A.—E. W. W.—J. D. W.—T. C.—"A Resident" (should have sent his name and address).—C. R. S.—W. S. W.—J. T.—H. I. J.—A. J. D.—J. P.—H. W. (should have sent amounts).—B. & H.—A. T. W.—S. Y. & Sons (inadmissible without amounts).

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